

Public

Dispatch Transparency Forum

28th January 2026

Agenda for the day

Slido Code # DTP

| | |
|--|---------------|
| Arrival, Registration & Coffee | 9:30 – 10:00 |
| Welcome | 10:00 – 10:15 |
| <ul style="list-style-type: none"> • Agenda and Housekeeping • Slido for Q&A and Feedback Survey • Meet the team | |
| Programme updates | 10:15 – 11.25 |
| <ul style="list-style-type: none"> • Roadmap, You said – we did and look ahead • Skip Rate recap • Root Cause Analysis (RCA) • Dispatch Strategic Review (DSR) outcomes • Future ENCC – additional capabilities | |

Workshop breakouts rotation

Materiality –
cost of skips

Skip Rate target

GC0166

Skips behind
constraints

| | |
|------------------------------------|---------------|
| Breakout 1 | 11:30 – 12:15 |
| Lunch | 12:15 – 13:00 |
| Breakout 2 | 13:00 – 13:45 |
| Breakout 3 | 13:45 – 14:30 |
| Break | 14:30 – 14:45 |
| Breakout 4 | 14:45 – 15:30 |
| Q&A and Feedback Survey | 15:30 – 15:45 |
| Close | 16:00 |

Housekeeping

Please note we will be taking **photos** and **video** throughout the day. Please let a member of the NESO team know if you don't want to be captured.

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How can you engage today?

Join at [Slido.com](https://www.slido.com)



#DTP

WIFI name: The Clermont
No password required

- 1. Throughout the day:** Q&A
- 2. During workshops:** Q&A
- 3. To close:** Survey for your feedback on our programme and on today

Roaming microphones during Q&A for you to ask questions directly

Q&A via Slido

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Please post any questions you have for our speakers on Slido – #DTP – ensuring to list both your full name and organisation; this will enable us to follow up with you after the event where necessary.



All questions posted in Slido will be published online with answers after the event; this will include any questions we are unable to answer in the session due to time constraints or the need for further information.



Out of scope questions will be forwarded on to the appropriate NESO team or expert for a direct response. We may ask you to contact us by email to ensure we have the correct contact details for the response.



Please use the Slido upvote function for questions asked, we will be taking questions in an upvoted order in the Q&A panel session at the end of the day.



Slido will close at the end of the event; if you have any further questions, please contact us at box.SkipRates@neso.energy

Meet the NESO team



Hannah Kirk-Wilson
Dispatch Transparency
Programme Director



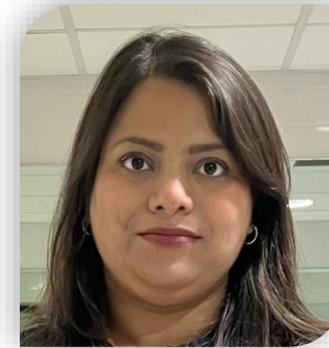
Katherine Munns
Skip Rates Technical
Manager



Sam Mancey
Senior Engineer



Vivian Echebima
Balancing Data
Scientist



Deepali Gupta
Senior Operational
Technical Analyst



Jean Hamman
Control Future Design
Energy and Strategy
Lead



Naomi Mason
Power Systems
Engineer – Industrial
Placement



Cathy Fraser
Head of Market
Requirements



Vikash Singh
Future Control
Strategy Lead



Simon Williams
Head of Power
Systems



Hannah Kerthaler
Head of Power
Systems



Scott Bannister
Power System
Engineer

Programme updates

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- Roadmap, You said – We did and look ahead
- Skip Rate Recap
- Root Cause Analysis (RCA) hypotheses
- Dispatch Strategic Review (DSR) outcomes
- Future ENCC – additional roles

Roadmap You said – We did Look ahead

Delivery: commitments & success measures

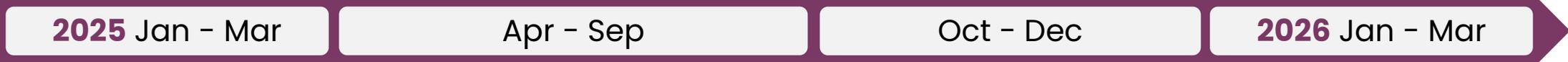
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- IT system changes
- Market change
- Dispatch efficiency measurement & transparency
- Forecasting improvements
- Complete

- ✓ **OBP: constraint management**
Improved situational awareness for dispatch of units behind constraints
- ✓ **Transparency tool improvements**
UI improvements live in control room
- ✓ **Increased response holding**
Managing frequency fluctuations
- ✓ **Additional dispatch engineers**
Full time battery dispatch engineer providing 24/7 cover

- ✓ **Root Cause Analysis Phase 1**
38 hypothesis identified
- ✓ **OBP: national optimisation**
Improved dispatch advice and efficiency
- ✓ **OBP: dispatch behind constraints**
Improved dispatch efficiency
- ✓ **GC1066 Approval** – Ofgem approve Grid Code modification
- ✓ **Forward looking tool**
Enhancements to Control Room skip rate tool
- ✓ **Quick Reserve Phase 2 Go Live** – Quicker energy imbalance restoration
- ✓ **Dispatch Strategic Review concludes**
- ✓ **Skip rate materiality**
Kicking off skip rate materiality work

- **Root Cause Analysis Phase 2**
Validation of hypothesis, identification of causal factors and mitigating actions
- **OBP: Constraint Optimisation**
Further improvement to dispatch behind constraints
- **Slow Reserve Go Live** – More sustained delivery in a post fault event
- **RCA & Dispatch review recommendations**
improvement projects
- **Improved Skip Rate Methodology**
Addressing tool methodology limitations to include MFR
- **Skips behind constraints**
Analysis and methodology development
- **Forecasting improvements**
Implemented in control room



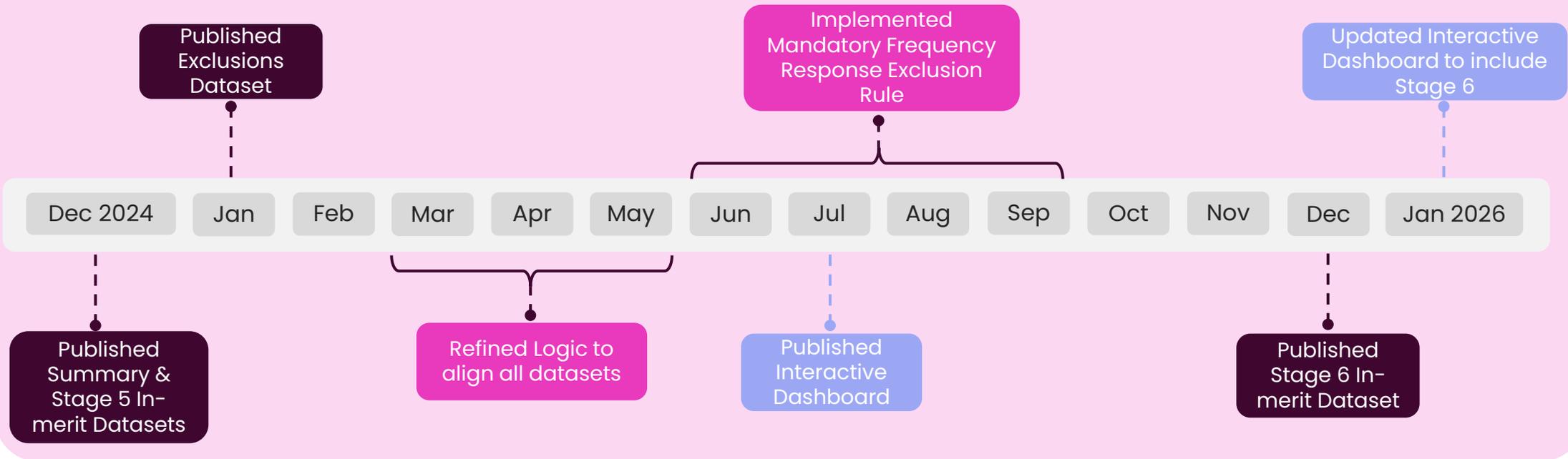
Skip Rates Recap

Summary

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Developing a skip rates methodology aimed to assess energy dispatch decisions to determine the frequency of skips, with the goal of increasing **consumer value** by substantially reducing “avoidable” skips where practicable and providing continued **transparency** in dispatch decisions.

Key Milestones



Key Definitions

Skip

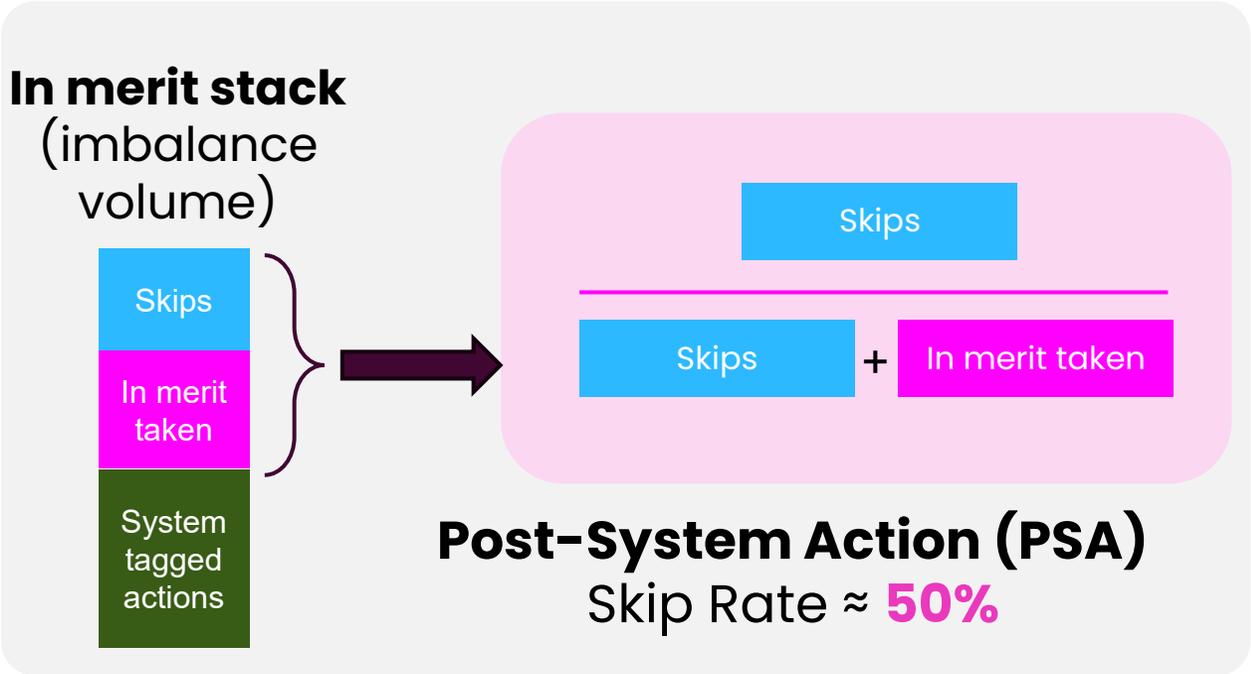
A skip occurs when a non-economic dispatch decision is made, meaning an instruction is sent via Bid-Offer-Acceptance (BOA) at a higher price than a possible alternative action.

Skip Rate

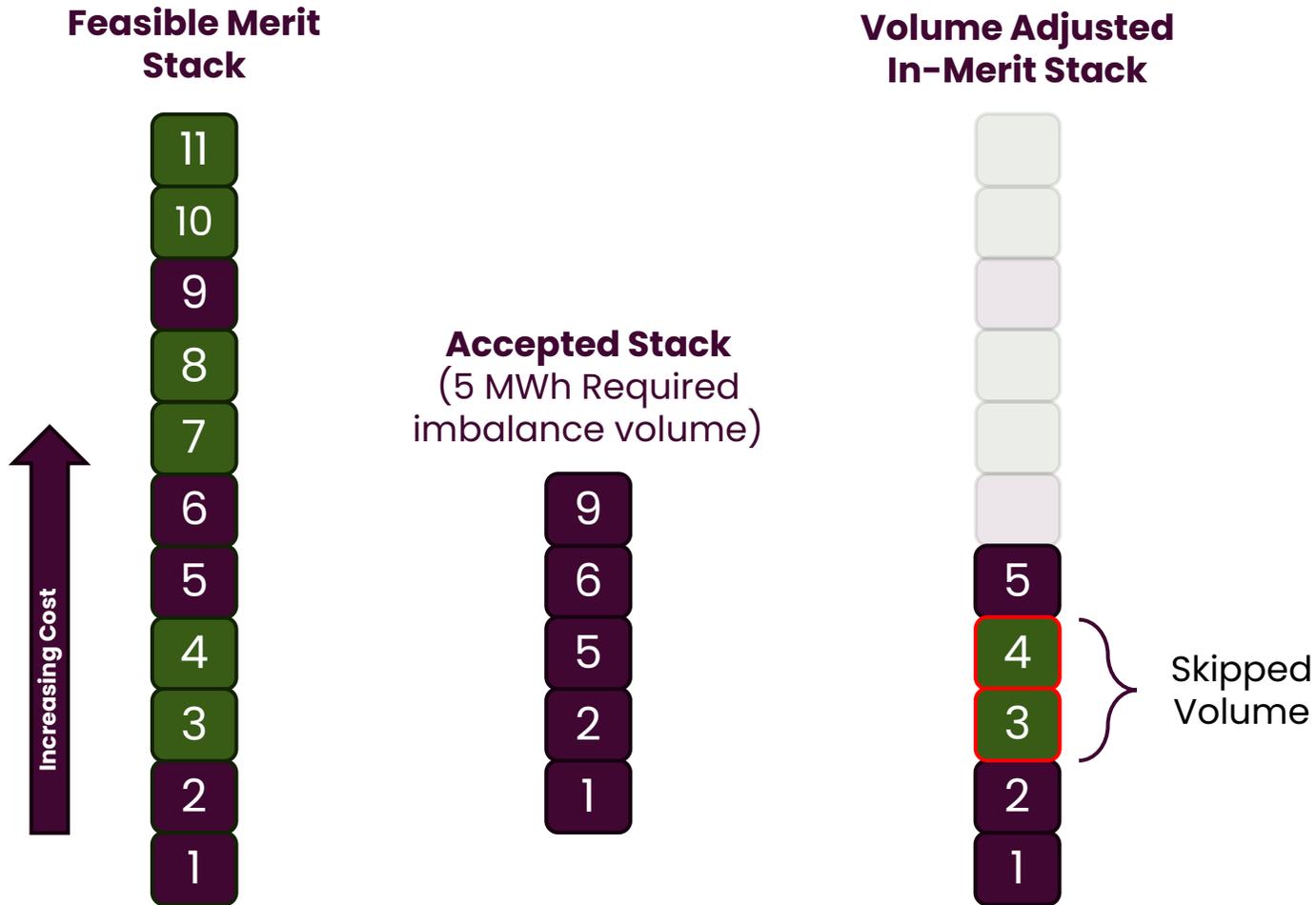
This refers to the frequency at which certain actions or assets are "skipped" during operational dispatch decisions.

Post-System Actions (PSA) Skip Rate

- A more targeted measure of skips, considering only the energy actions we could have taken over the relevant period
- Defined as the proportion of bid or offer volume in-price merit and not accepted to the total amount of accepted energy volume for a given 5-minute period.



Skip Rate Methodology



Each box represents 1 MWh

- Slido Code # DTP
- Key:**
- Feasible volume of 1MWh - not accepted by the control room
 - Feasible volume of 1MWh - accepted by the control room

Calculated at **5-minute granularity** for bids & offers

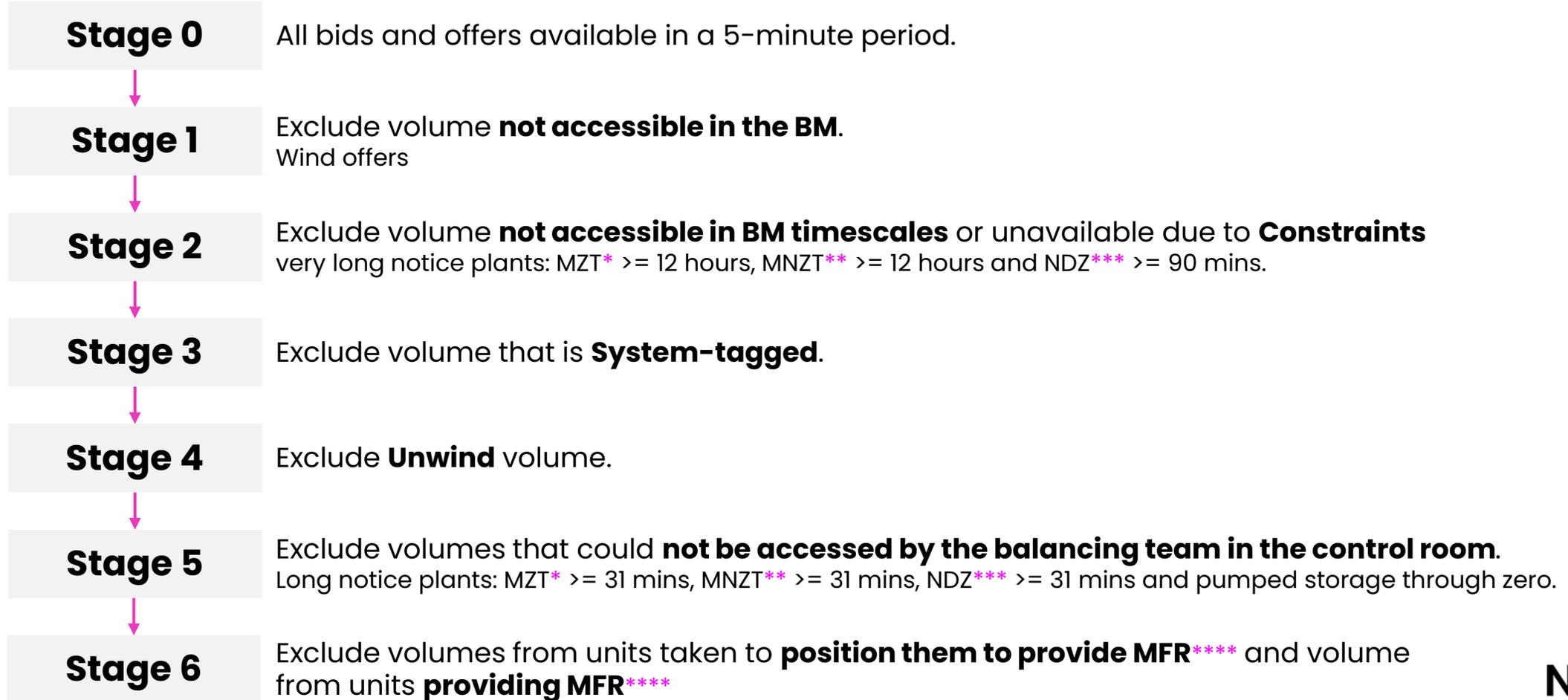
$$\text{Skip rate} = \frac{2 \text{ MWh (green)}}{5 \text{ MWh (green + purple)}} = 40\%$$

Exclusions

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Exclusions are made because **not all units can be dispatched in real time.**

Note: The stages **do not align** to our operational processes.

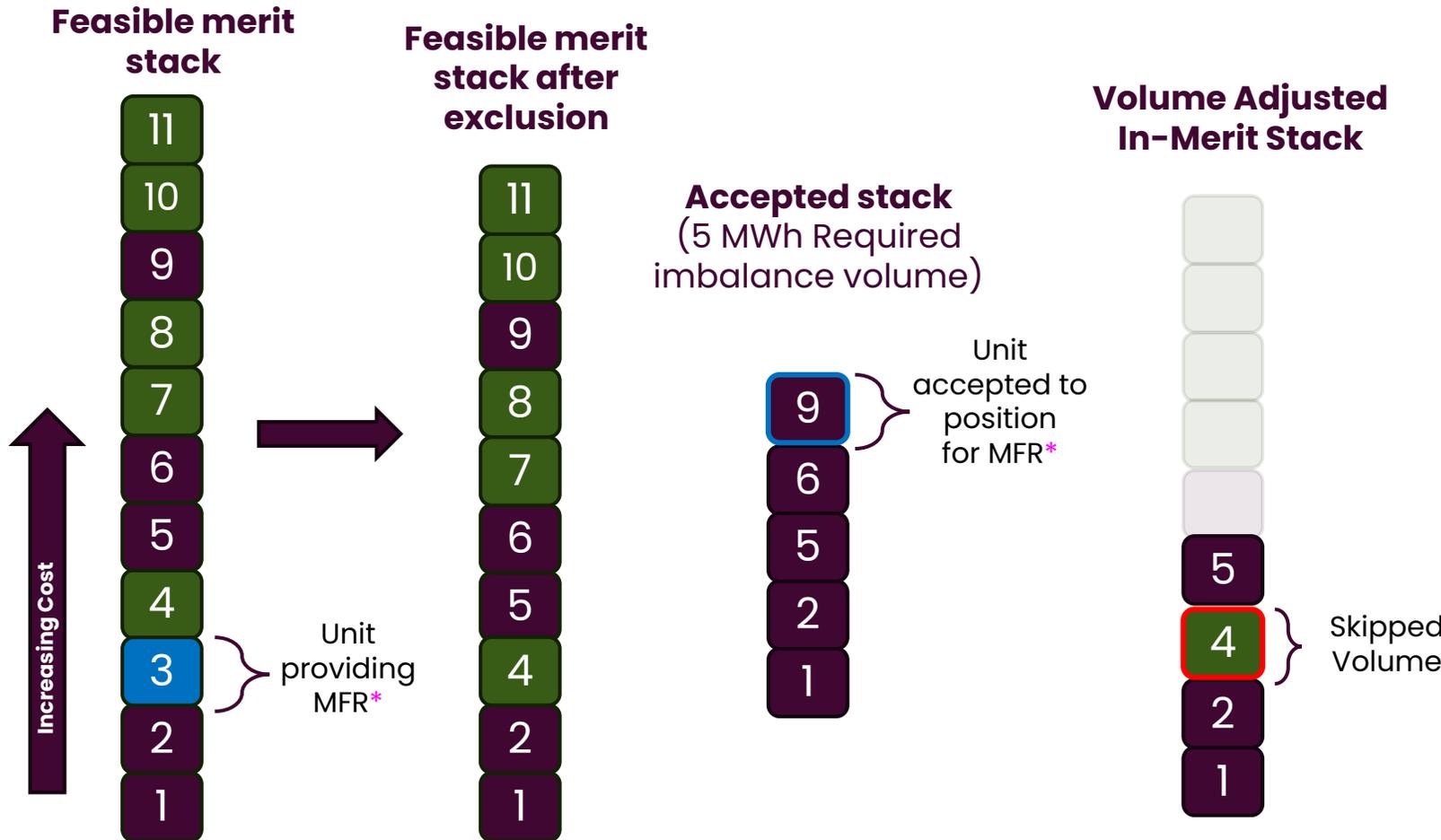


Exclusions Example – Stage 6

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Key:

- Feasible volume of 1MWh - not accepted by the control room
- Feasible volume of 1MWh - accepted by the control room



Calculated at **5-minute granularity** for bids & offers

$$\text{Skip rate} = \frac{1 \text{ MWh (green)}}{4 \text{ MWh (green + purple)}} = 25\%$$

Each box represents 1 MWh

Limitations



The Stage 6 dataset excludes units providing Mandatory Frequency Response

Update:

- Spin Gen, Spin Pump: implementation is not possible due to legal restrictions that prevent publication of the dataset
- Battery SOC: GC0166 completed and approved by Ofgem, to go-live in June 2026. Update methodology to include the new MDO/MDB parameter
- Ramp Rates: agreed not to implement for these reasons;
 - Complex method with large number of edge cases
 - Small number of units impacted
 - A simpler method would lead to restrictive assumptions

Consideration to conduct a stand-alone assessment of ramp rates via the root cause analysis



Mandatory Frequency response



Spin Gen, Spin Pump



Battery State of Charge



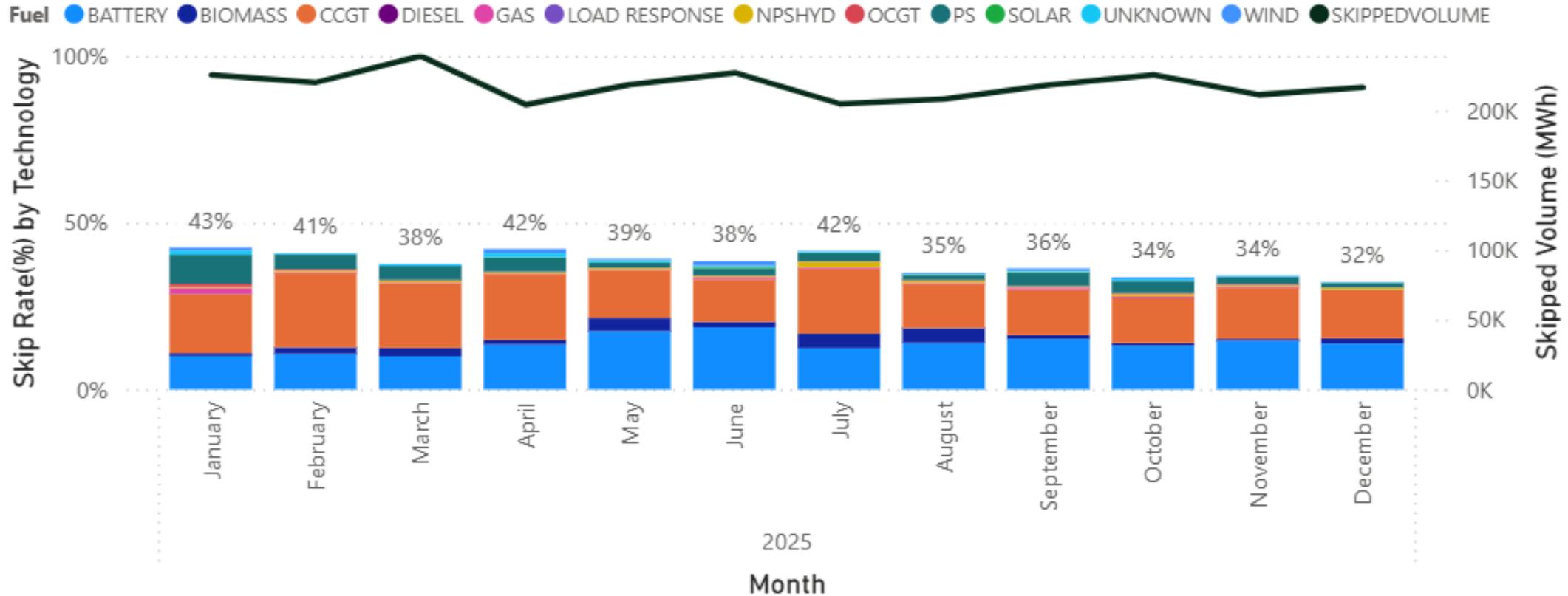
Ramp Rates

Combined Skip Rate – 1st Year Summary

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The current skip rate methodology only considers energy actions within the BM

Relative-Technology Skip Rate



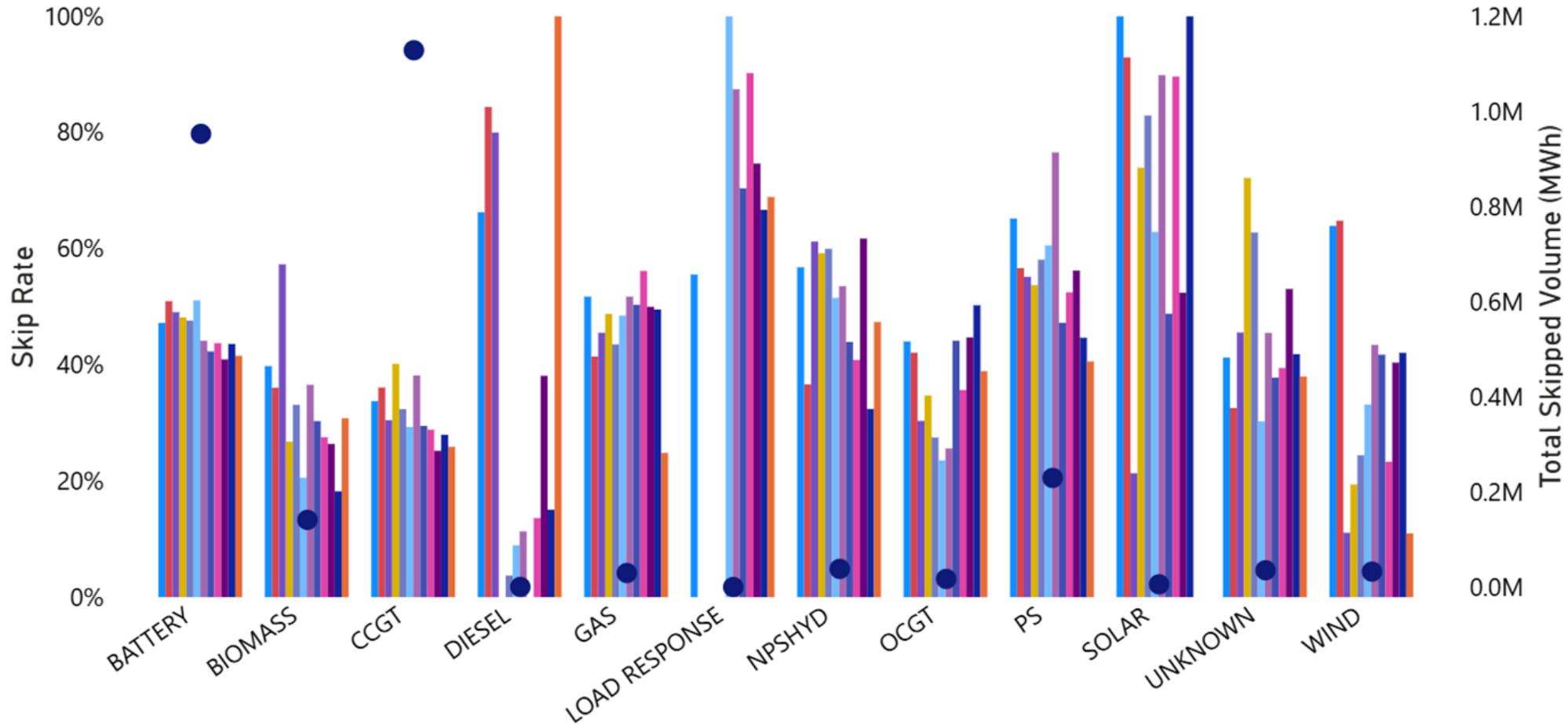
Combined Skip Rate – 1st Year Summary

Slido Code # DTP

The current skip rate methodology only considers energy actions within the BM

Technology-Specific Skip Rate

Legend: January (light blue), February (red), March (purple), April (yellow), May (light blue), June (light purple), July (pink), August (dark blue), September (magenta), October (dark purple), November (dark blue), December (orange), Total Skipped Volume (MWh) (dark blue dot)



Gas: Gas reciprocating units
NPSHYD: Non-Pumped Storage Hydro
PS: Pumped Storage

Useful Resources

Webinars

- [GC0166 Grid Code Modification](#) – December 15, 2025
- [Dispatch Transparency Updates](#) – November 3, 2025
- [Data Interpretation](#) – August 7, 2025
- [Battery Storage & Skip Rates \(Data, Methodology & Next Steps\)](#) – February 27, 2025
- [LCP Methodology Webinar \(Analysis and Findings\)](#) – December 19, 2024

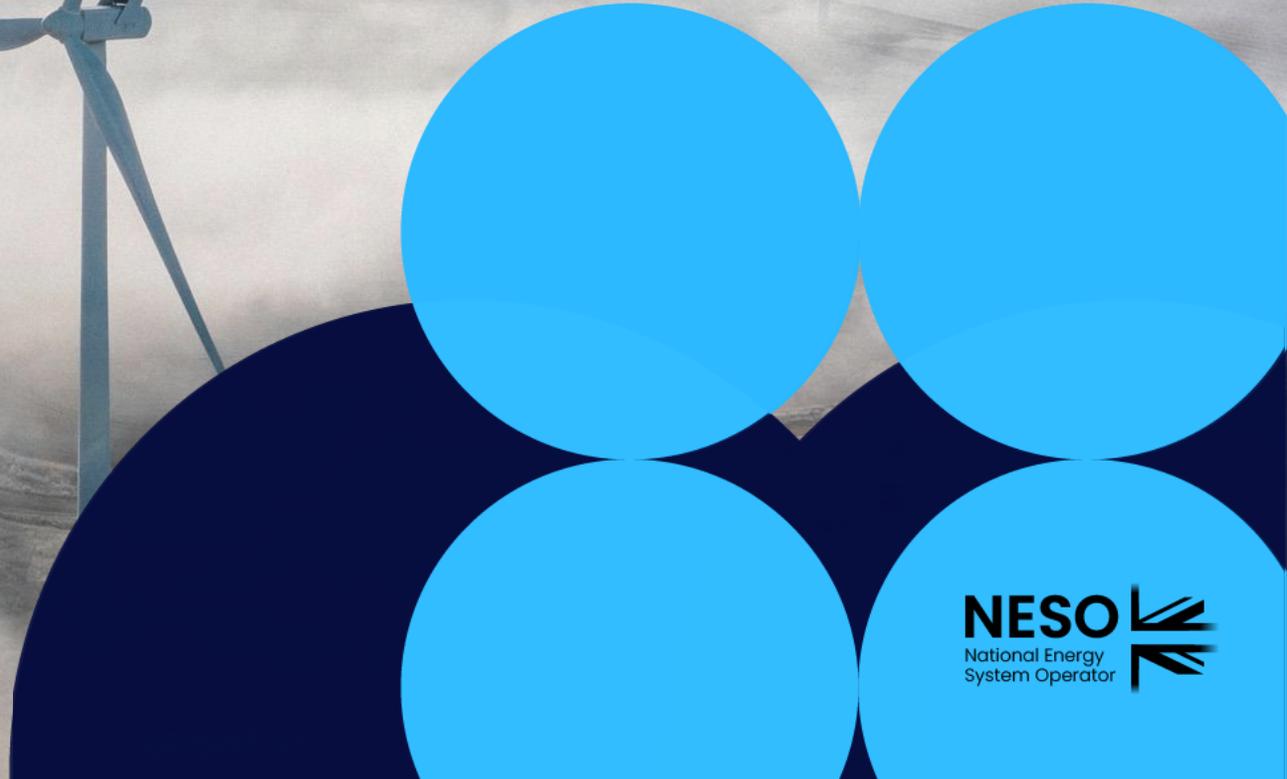
Forums

[Balancing Programme](#) – November 18, 2025
[Skip Rates, Breakout Session - Skip Rate Methodology Changes](#) – May 1, 2025
Video recordings of other breakout sessions on [Skip rates | National Energy System Operator](#) Past Event tab

Others

[Skip Rates | National Energy System Operator](#) – skip rates data portal
[Skip rates | National Energy System Operator](#) – supporting documentations, Q&A, and interactive dashboard
[Battery storage | National Energy System Operator](#) – past events, documentations, etc

Root Cause Analysis (RCA) hypotheses



Contents

1. Introduction to Root Cause Analysis
2. Phase 1: hypotheses identification
3. Phase 2: evaluating hypotheses
4. Looking forward

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Introduction

Focused on **Stage 5 & 6 Post System Action** skips – balancing skips

Purpose:

Understand why skips occur in the Balancing Mechanism and how to reduce them.

Objectives:

- Identify root causes of skips.
- Improve transparency.
- Develop actionable recommendations.

Approach:

Two phased approach

Phase 1: hypotheses generation and data exploration

Phase 2: quantification, validation, causation and recommendations.

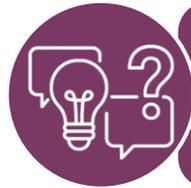
Phase 1: complete



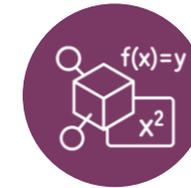
Workshops



**Exploratory Data
Analysis (EDA)**



**Hypothesis
Generation**



**Modelling
Techniques**

Phase 1 aim

Use **workshops** and **EDA** to **generate hypotheses** and identify suitable **modelling techniques** for Phase 2.

| Category | Example Hypothesis |
|-----------------------------------|---|
| Market Impacts | BMUs are more likely to be skipped when there is insufficient positive reserve available. |
| Operational Discretion | BMUs from certain technology types may be accepted out of merit by ENCC engineers during difficult system conditions. |
| Methodological Limitations | BMUs that actively hold MFR have a higher likelihood of being skipped to maintain capacity to provide frequency response. |
| System Errors | BMUs are skipped due to inefficiencies within SORT's zonal despatch advice algorithm. |
| Forecasting Errors | Demand forecasting errors from T-1 to real-time increase uncertainty, which results in an increased number of skips |
| Technical Limitations | BMUs with high MNZT (Minimum Non-Zero Time) have a higher likelihood of being skipped during rapid system changes. |

Phase 2: hypotheses evaluated

The quantitative evaluation of hypotheses is being done in priority order.

Mandatory Frequency Response (MFR)

Units providing MFR may appear accepted out of merit or skipped.

Strong Impact | **Next steps:** implement methodology update 

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Zonal allocation

Volume that was skipped because of volume being accepted out of merit in a different zone.

Strong Impact | **Next steps:** conduct further analysis 

Spin Gen & Spin Pump

Units providing Spin Gen or Spin Pump may appear as skipped.

Moderate impact | **Next steps:** quantify and add to the minimum target 

Positive reserve

Actions taken to create positive reserve may result in skipped volume.

Moderate impact | **Next steps:** conduct further analysis 

Phase 2: hypotheses evaluated

The quantitative evaluation of hypotheses is being done in priority order.

Open Balancing Platform

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Characteristics of the open balancing platform may result in skips.

Moderate impact | **Next steps:** communicate impact of analysis 

Forecasting (wind, interconnectors, day-ahead demand)

Error in other forecasts may lead to accepted out of merit or skipped volume.

Wind = **Moderate impact** | **Next steps:** conduct further analysis 

Others = **Weak impact** | **Next steps:** reject and move on 

Frequency

Volatility or large deviations in frequency lead to skipped volume.

Weak impact | **Next steps:** reject and move on 

Replacement energy

Large volume of offers required to replace wind bids may result in accepted out of merit volume.

Weak impact | **Next steps:** reject and move on 

Phase 2: hypotheses in progress

The quantitative
evaluation of
hypotheses is being
done in priority order.

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SORT Dispatch Advice

The control room's optimised dispatch advice may be leading to skips



SORT Demand Predictor

The control room's demand prediction may be resulting in skips



Difficult system conditions

A variety of difficult system conditions may be leading to skips



Ramp rates

Unit ramp rates may limit a unit's ability to meet a dispatch requirement, leading to skipped volume



MIL/MEL redeclarations

Redeclaring MIL/MEL close to real time may impact the control room's ability to dispatch a unit



Operational Discretion

Individual operator decision making

Phase 2: hypotheses backlog

The quantitative evaluation of hypotheses is being done in priority order.

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Maintaining headroom

Maintaining headroom for optionality may lead to skipped volume



Real-time constraint limit updates

Changing constraint limits in real time may cause units to appear skipped



5% constraint buffer

The skip rate method assumes a 5% safety margin for managing constraints, which may result in skipped volume



Dispatching small capacity via SORT

The manual dispatch process takes longer to dispatch more smaller units, compared with fewer larger units

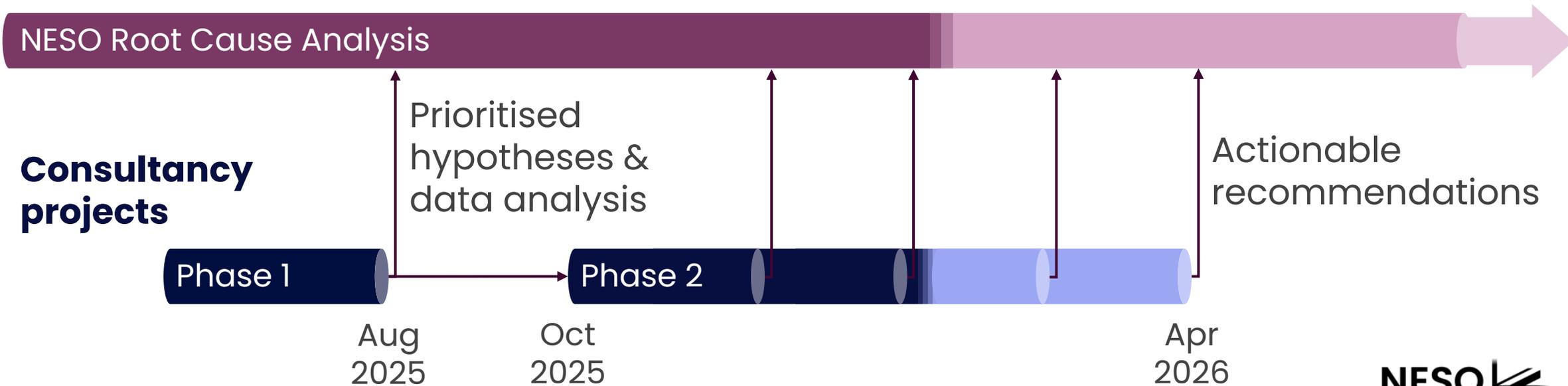


Large generation swings

PNs show large & rapid changes in generator output, which requires management

Looking forward

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Consultancy projects

Prioritised hypotheses & data analysis

Actionable recommendations

Phase 1

Phase 2

Aug 2025

Oct 2025

Apr 2026



**For simplicity, some relate to multiple similar hypotheses*

Dispatch Strategic Review (DSR) outcomes

Simon Williams

What is the Dispatch Strategic Review

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- The GB energy system is undergoing a period of profound transformation, driven by rapid decarbonisation, the integration of renewable generation, electrification of demand and increasing system complexity. These changes are creating new operational challenges for the Electricity National Control Centre (ENCC), which must ensure that its processes, systems, and culture remain robust and adaptable to future needs.
- To address this, NESO commissioned an independent review of control room processes, systems, and operating model associated with energy scheduling and dispatch.
- This was completed during Summer and Autumn 2025 using external consultants.

Analysis Lenses

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System Security

- **Network reliability**, including thermal, voltage, stability, restoration, and sub-synchronous oscillations.
- **Network balancing**, including frequency, within day flexibility, and system adequacy.
- Physical network problems arising from system change.



Cost Efficiency

- License obligation to demonstrate **cost-effective decision-making in system operation**, market development, and strategic planning.
- **Accountability to SoS for financial decisions** as part of framework agreement.



Market Facilitation

- NESO framework requirement to act in accordance with principles of **transparency, coordination, and accessibility** in its market-facing activities.
- License and framework requirements to **integrate national and local flexibility markets**.
- ESO – DNO interactions and market primacy issues.



Regulation & Agreements

- Adherence to **license obligations** and **framework agreement**.
- Adherence to **technical codes and standards** (e.g. SQSS and grid code).
- **Market changes**, such as reformed national pricing and changes to operability services.



Tools & Infrastructure

- Inception and Integration of **new digital tools and infrastructure** required to facilitate scheduling and dispatch in 2030 and beyond (e.g. OBP).
- **Migration from legacy systems**, such as SORT and SPICE.
- Cyber security



Skills & Processes

- **Volumes of processes and procedures** operators must adhere to.
- Change to current **processes and ways of working** to meet future system needs.
- New **skillsets, roles, and human resources** required in scheduling and dispatch process.

Aims and Outcomes

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- Key Aim: To recommend changes to tools, processes, or operating model to make the ENCC ready to meet 2030 energy system challenges
- N.B. This piece of work will have an effect on Skip Rates but was not solely focussed on skip rates.
- The Review included:
 - Data analysis of scheduling vs outturn performance.
 - Analysis of control room processes.
 - Control room shadowing.
- A list of 33 separate recommendations to meet the 2030 energy system challenges was produced.
- Some of these are shorter term recommendations with others requiring more analysis and longer-term development.
- Some recommendations will feed directly into existing programmes of work whilst others require new workstreams to be developed.

The 33 Recommendations – grouped into 5 Initiatives

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Data & AI Strategy

Foundation for AI-driven control rooms through data standards, automation, and operator readiness.

Benefits: Higher quality & volume of data available for use within and external to the Control Room.

Op-Model (System Ops)

Implement sys-op review recommendations under a single owner to align with DSR and avoid duplication

Benefits: Address key pain points for the directorate, including risk management, resource allocation, and clear management of how change enters the Control Room.

Op-Model Structure Recommendation (ENCC)

Review Scheduling and Dispatch roles and structure to align with new software and future operations.

Benefits: Essential to ensure that staffing within the ENCC is fit for operation of the transmission system in 2030 and beyond, taking into account software developments, generation portfolio and market changes.

Balancing Platform (OBP)

OBP focuses on replacing outdated systems while integrating DSR-aligned enhancements with ENCC sponsorship

Benefits: Ensures that OBP delivers value to GB consumers.

Distributed Energy Resource (DER) Integration

Improve control room visibility of distributed energy via TIDE, requiring industry buy-in and code changes

Benefits: Improved DER visibility would reduce balancing and system costs through improved forecasting, increased competition and reduced reserve requirements

Data & AI Strategy

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Overview:

Operators now face a dramatic increase in the number of assets they must manage, the volumes of data they must process, and complexity that will soon exceed un-aided human cognitive capacity. This initiative establishes the foundation for integrating AI tools into the control room. It focuses on structuring data to ensure it is suitable for future AI/ML projects, exploring the deployment of technologies such as NLP and LLMs, and developing tools to automatically populate reports with built-in checks for missing or erroneous data. Additionally, it examines control room roles that could support ongoing data management and the training of AI/ML models. The standards defined through this project will serve as a blueprint for the broader rollout of data standards across NESO.

To ensure adoption, Transformation team engagement is essential. Their involvement will support operator readiness for AI-driven processes and new ways of working.

Benefits:

- Control room is the creator, rather than recipient of NESO data formatting standards.
- Higher quality & volume of data available for AI tools, reducing the future costs of projects that will implement AI/ML.
- Early tools could allow actionable insights from fragmented data.

DSR Recommendations:

Data Standards

Data formatting standards

AI Tools

Free text NLP Tool

Business Process LLM

Data Management

Updated OEM Reports

ENCC Data Management

Op-Model (System Ops)

Overview:

An initial sys-op wide op-model capability review was completed in 2025. The next step is implementation of the recommendations as part of that review.

Many of the recommendations made as part of the sys-op op-model review directly align with those coming out of DSR, including teams that manage control room change (including IT change), the cementation of forecasting capabilities outside of the control room and the management of human factors. Making sure this work is delivered by a single owner will make sure that work is not duplicated by different teams/directorates.

Benefits:

- Address key pain points for the directorate, including risk management, resource allocation, and clear management of how change enters the Control Room.
- Reduction in control room grey IT which poses cost-operability risks.
- Improvement in forecasting capabilities.

DSR Recommendations:

Human Factors

Human Factors
Integration Plan

ENCC Shadowing
Plan

IT Management

Grey IT Integration
Process

IT Change Request
Process

Market Design Tool
Requirements

Forecasting

Forecasting
Responsibility

Forecast Frequency

Public Op-Model Structure Recommendation (ENCC)

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Overview:

Scheduling and Energy functions in the Control Room have remained largely unchanged for years, despite major shifts in transmission operations driven by net zero targets and increased interconnectors. With generation dispatch software being replaced by OBP and Scheduling software set to follow within two years, this initiative will review how Scheduling and Dispatch are managed, including potential changes to roles and reporting lines, to ensure staffing is fit for future operations and new software capabilities through 2030 and beyond. The review will be carried out in collaboration with the Future Design Team, building on their existing work in this area.

The key objective is to set the agreed direction and structure for the organisational model to embed in future activities. It is anticipated to get to the end state will take a further two/three years to deliver.

Benefits:

- Essential to ensure that staffing within the ENCC is fit for operation of the transmission system in 2030 and beyond, taking into account software developments.
- Will help ensure OBP delivers value for consumers.

DSR Recommendations:

Authorisations

Optimised
Authorisations

Human Factors
Audit

Future Roles

Interconnector
Management

ENCC Data
Management

Market Participant
Comms

Deployment

Additional NBE

Balancing Platform (OBP)

Overview:

The OBP project is a well-established initiative currently midway through delivering a replacement for the existing Balancing Mechanism tools. The project operates under a defined intake process and maintains a prioritised list of deliverables that fall outside the scope of this review.

The primary focus remains on delivering the replacement for the outdated systems. However, there is also an opportunity to incorporate enhancements aligned with the recommendations from DSR. All recommendations should be integrated into the OBP project.

Benefits:

- Opportunity to remove manually intensive processes, freeing up operator time and creating alignment and consistency.
- Lays groundwork for Volta led scheduling changes.
- Ensures that OBP delivers enhanced value to GB consumers.

DSR Recommendations:

Preliminary

Grey IT Audit

Capabilities

OBP UI Automation

Repeat BOAs

Bulk MW Dispatch

OBP Zone Flexibility

Automated System
Flags

Redundancy
Systems Update

Volta

SOP Frequency

Probabilistic SOPs

Live/Automatic SOP
Margin Analysis

Distributed Energy Resource (DER) Integration

Overview:

Currently, a significant amount of distribution-connected metering data is not visible to the Control Room. Securing broad access to this data will require code changes and/or the introduction of new market services. This will require buy-in from industry to achieve and so the business case needs to be understood and agreed. The Transformation to Integrate Distributed Energy (TIDE) Programme has been established to coordinate and support delivery of activity to improve NESO's visibility and access to distributed energy assets. The requirements of the control room should be fed into the TIDE programme so that this activity can be appropriately prioritised and delivered. This work will also be useful to assess the impact of a lower BMU threshold in the Reformed National Pricing Work

Benefits:

- Improved DER visibility would reduce balancing and system costs through improved forecasting, increased competition and reduced reserve requirements
- This would also reduce skip rates, based on the skip rate hypotheses relating to embedded generation.

Indicative Work Packages:

TIDE Programme

Operational
Metering Benefits

What's Next?

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- Some work packages feed directly into existing workstreams.
- Others need new workstreams to be set up.
- Some will require external expertise to help NESO achieve the desired aims.

Future Control Strategy

New Control Room Capabilities



Agenda

- **What is Future Control Strategy**
- **Objective – “ Why this session “**
- **Background – “Why Control Room needs new capabilities”**
- **FCS updates till now**
- **New Control Room Capabilities**
- **Why It’s Important for you**
- **How can you help**



Future Control Strategy

Who we are & What are we doing

- Refers to a specific workstream focussing on ensuring the structure of **roles and responsibilities** in the control room and supporting functions are set up to meet the challenges of future power system.
- Assessing significant changes expected to impact the control room over the next **5-10 years** and developing an understanding of the new and different things the control Room teams need to be able to do as a result.



Objective

“Why this session”

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Explain how the **Control Room** is evolving to operate a more **complex, cleaner & decentralised** GB power system



Gather organised **feedback** from **stakeholders**. Also, sense check the grasp of primary **challenges**



Inform about the **changes** that NESO is planning to bring into its **Control Room** in the form of **evolved capabilities**.



Build **trust & transparency**

What FCS Did

22+

Changes occurring across the industry were analysed.

For example – Response, Reserve, DERs

13

Workshops conducted internally with the identified changes as key drivers

80

Control Room Subject Matter Experts were consulted

1300+

Comments received during the workshops

Outcome

31

Capability themes developed with respective enabling actions

180

Potential changes required for operating the future control room

Background

“Why Control Room needs new capabilities”

As per Future Energy Scenario (FES) Data



- 20-85% increase in Demand flexibility
- 18-36 GW increase in overall flexibility
- 20-30% increase in interconnector capacity & 5x higher Re-Dispatch Capability
- 20-60% distributed generation



2x Eastern links will add 4GW capacity reducing the pressure on Constraints but will add modelling complexity.

Secondly, increase in new connection & sheer volume of DERs will need great forecasting capabilities

Increasing complexity, a more dynamic system, means the ENCC needs enhanced Capabilities

The shift to renewables → more asynchronous & weather-dependent generation, → control room to manage greater fluctuations in supply & demand

This ongoing transition has brought in to focus the need for an evolution in our approach to operating the power system from a roles and responsibilities perspective as well as tooling and data.



New control room capabilities

4 New ENCC Capabilities

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Data Specialisation:

Lead data discovery, validation, and specification of new requirements. This includes identifying and resolving data issues, managing change requests, and ensuring data quality across operational datasets.

Market insight

analysis: Applying economics expertise to inform forecasts for how changing energy prices will impact demand levels through flexible tariffs, as well as changing interconnector flows.

Operational

efficiency: Enable real-time insights, close feedback loops, and foster active coordination between transmission and dispatch through improved logging and engagement.

Operational Customer Co-ordination:

Supporting operational queries for stakeholders, utilising collected insight, and providing a focal point for longer-term queries requiring control room input.

Why it's Important for you

What's in it for you –
Right Now

Generators & Suppliers

1

Market Insight Capability

- Forecast & Economics expertise helping in demand/generation.
- Supports strategies that minimise imbalance costs & enhance system stability, benefiting generators through clearer operational signals.
- Provide visibility into market behaviour linked to operation decision .

2

Data Specialisation Capability

- Will support in Data Sharing Infrastructure
- Fill the real time and post event Data Gaps between the control room & the Stakeholders

3

Operation Efficiency Capability

- Ensures efficient dispatch & Feedback loop on BOAs
- Systems to log key decision points, actions taken (and their rationale)
- Enhanced forecasting allows for fewer balancing actions to be taken

4

Operation Customer Co-Ordination Capability

- Act as a single point of contact for operations queries
- Quicker updates & explanation on the curtailment and balancing actions.

Summary of capabilities & stakeholder impact

| Capability | Generators | TOs | DNOs / DSOs | Interconnectors | Market Participants | Ofgem / Regulators |
|-------------------------------|--|---|---|---|--|--|
| Operational Efficiency |  Ensures efficient dispatch, feedback loop on BOAs |  Coordination on transmission outages |  Input to efficiency of local balancing |  Informs redispatch efficiency |  Highlights inefficiencies in balancing actions |  Reports efficiencies to regulator context |
| Market Insight |  Forecast & Economics expertise helping in demand/generation | |  Supports visibility of DER / demand-side |  Inputs to interconnector flows |  Supports market efficiency forecasts |  Provides demand forecast strategy assurance |
| Customer Coordination |  Primary contact for queries, outage comms |  Liaison for real-time TO queries |  Manages DSO/DSO operational queries |  Key comms during interconnector issues |  Contact point for urgent market participant comms |  Evidence of clear comms structure |
| ENCC Data Capability |  Validates forecasted vs actual gen |  Validates outage data in real time |  Provides visibility of DER data |  Improves data validation on flows |  Ensures data quality for flexibility |  Evidence to Ofgem of robust data validation |

How can you help shape this

Slido Code # DTP

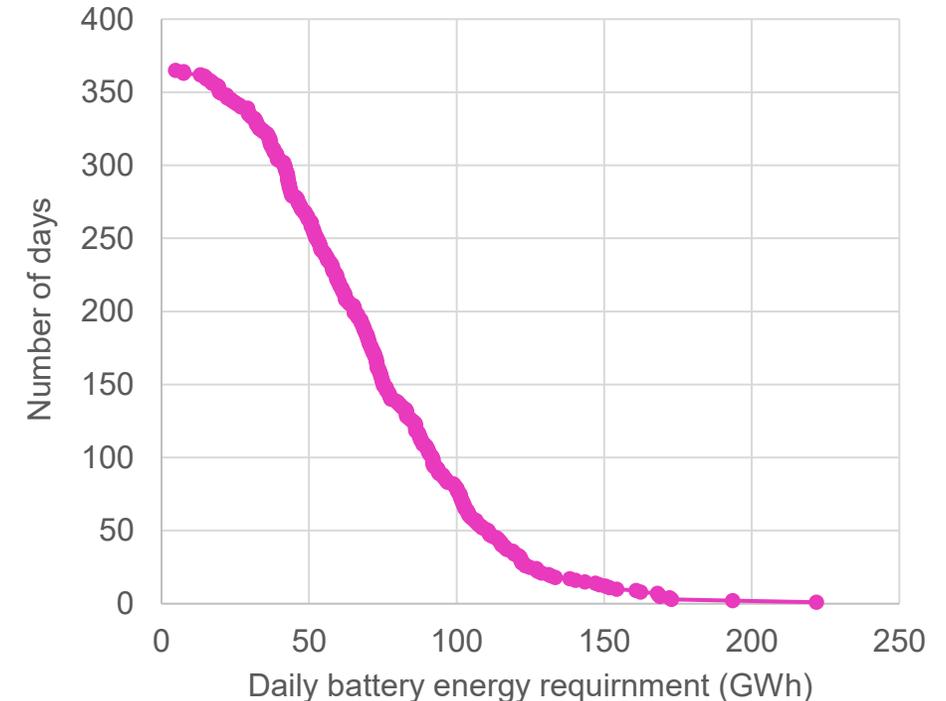
- Any changes that have been missed?
- Do you agree with our high-level assessment of the challenges these changes pose?
- Are there any additional real-time operational capabilities you believe NESO needs?
- Is there the need/appetite for an ongoing forum?
- What might this look like?

Flexibility Opportunity Tool

We are developing some modelling that explores the size of the flexibility opportunity

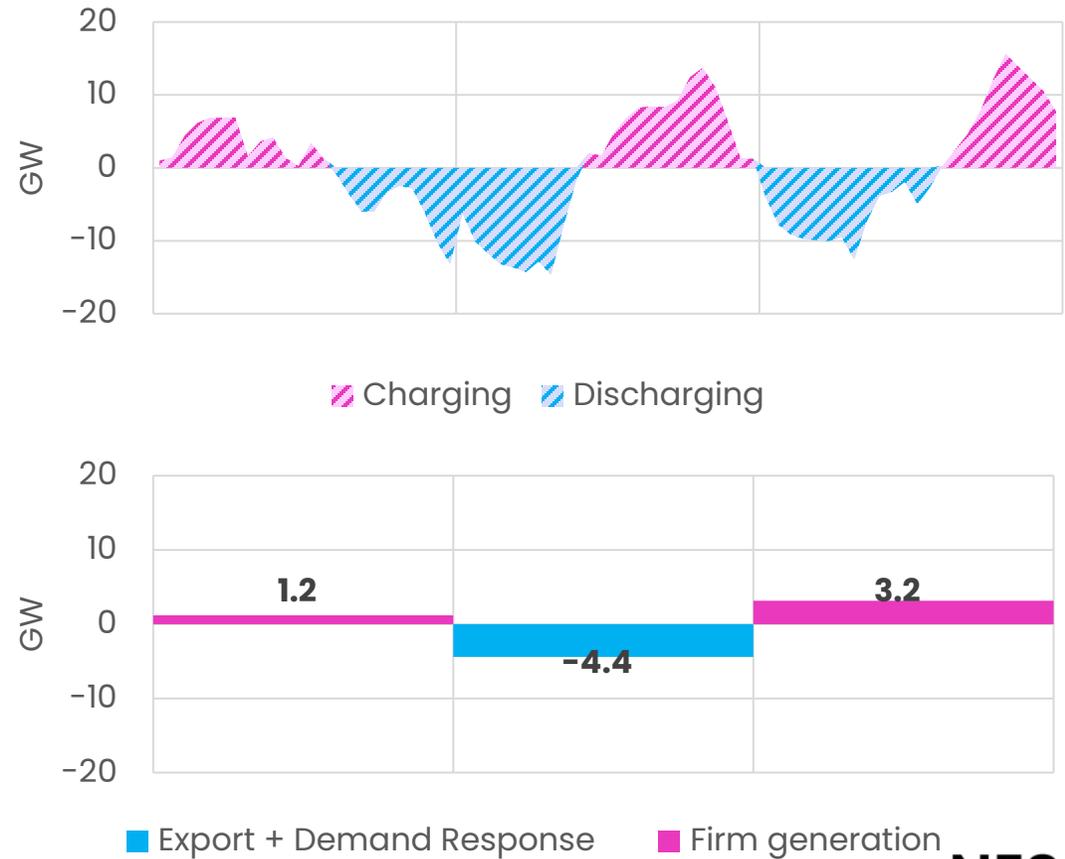
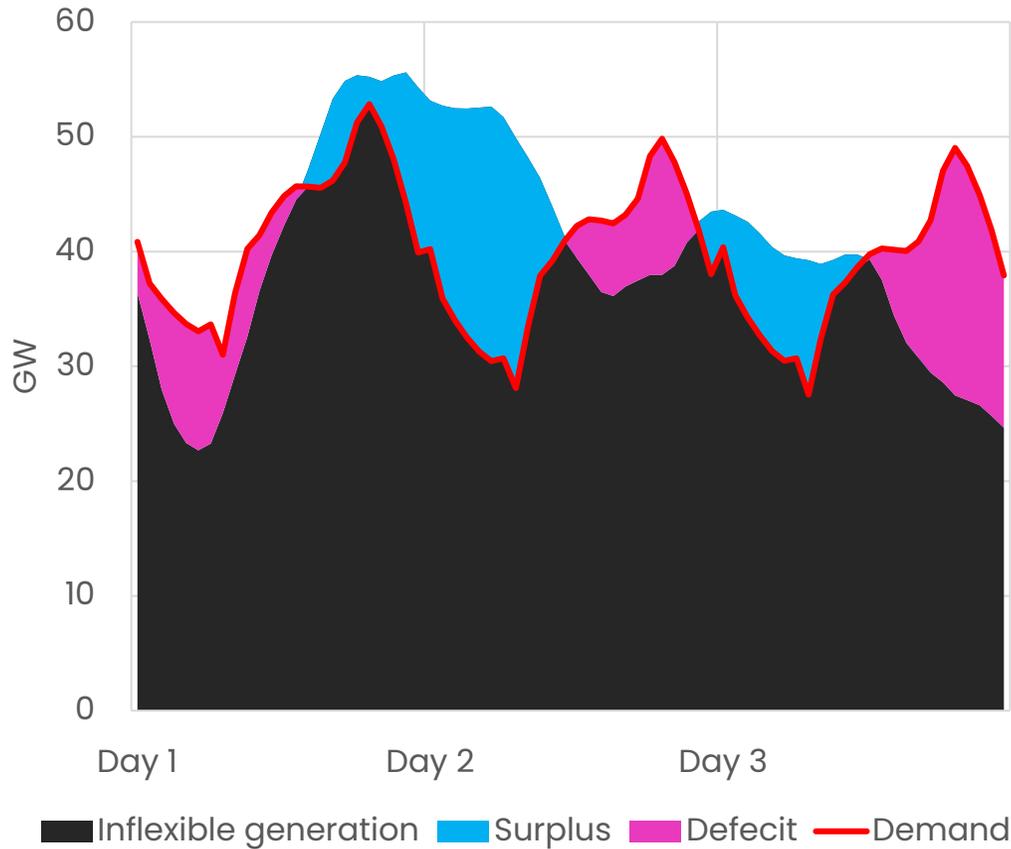
- Our prototype uses hourly dispatch data from the Future Energy Scenarios to showcase the scale of the flexibility opportunity based on daily arbitrage under different conditions.
- Users can change peak demand, weather year profiles, new build capacities (wind, solar, nuclear, etc), existing storage, and DSR potential.
- The tool answers: **Given expected energy demand and inflexible power generation, what is the maximum intraday arbitrage opportunity?**

Illustrative output: Number of days requiring specified flexibility, 2030



Sample hourly outputs showing net demand and charging behaviour

Illustrative outputs



We want to hear from you

If you have thoughts, you'd like to share with us about this tool or would like to learn more, please reach out.

FES@neso.energy

Introduction to workshops

- Materiality (cost of skips)
- Skip Rate reduction target
- Skips behind constraints
- GC0166

Workshop breakout groups

Slido Code # DTP

- Please refer to your lanyard colour.
- Each workshop will be 45 mins, including time for their own Q&A

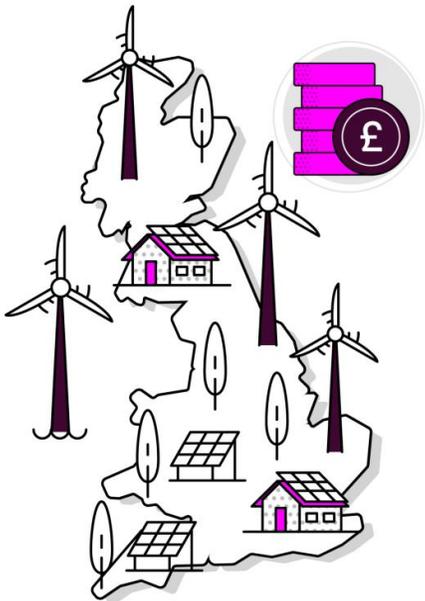
| | Materiality (cost of skips) | Skip Rate reduction target | Skips behind constraints | GC0166 |
|---|-----------------------------|----------------------------|--------------------------|------------------|
| | Ballroom | Canterbury Suite | Nelson | Trafalgar |
| Workshop 1 – 11:30 – 12:15 | Group A (yellow) | Group B (green) | Group C (purple) | Group D (black) |
| Lunch | | | | |
| Workshop 2 – 13:00 – 13:45 | Group B (green) | Group C (purple) | Group D (black) | Group A (yellow) |
| Workshop 3 – 13:45 – 14:30 | Group C (purple) | Group D (black) | Group A (yellow) | Group B (green) |
| Break | | | | |
| Workshop 4 – 14:45 – 15:30 | Group D (black) | Group A (yellow) | Group B (green) | Group C (purple) |
| Return to main room for Slido Q&A, Feedback and wrap up | | | | |

Breakout Materiality – cost of skips

Skip rates in the context of a changing BM

Slido Code # DTP

The volume of balancing actions in the Balancing Market (BM) has significantly increased, more than doubling in the last decade and rising by 17% from 2023/24 to 2024/25 alone

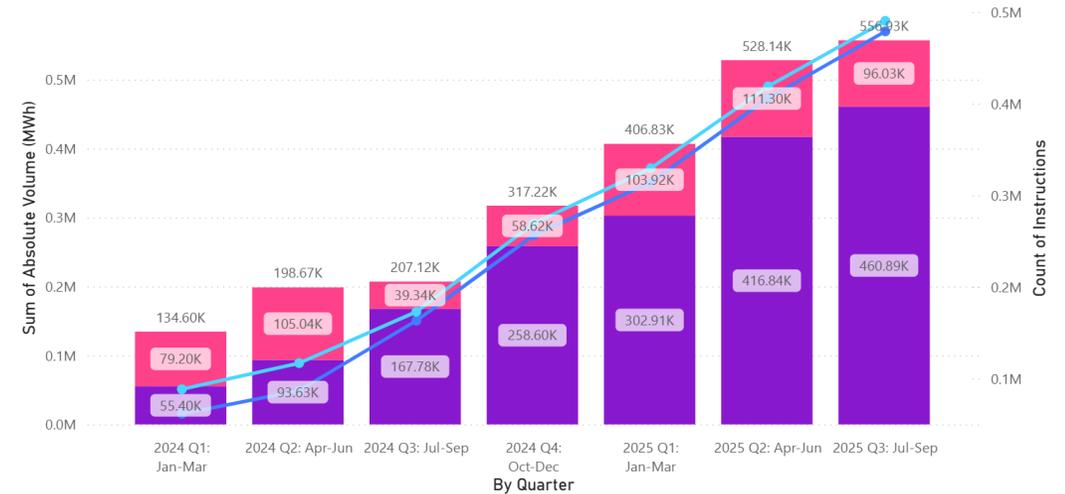


BM actions now need to address not only the overall supply and demand balance but also specific locational issues and system stability challenges

The control room must constantly balance operational risk against the cost of actions, and skip rate measurements assume perfect hindsight, which is not feasible in real-time operations

Absolute Volume (MWh) and Instruction Count by Date

OBP or Other ● OBP ● Other ● OBP Instructions ● Total Instructions



Scope

The skip rate methodology is focussed on **BM energy actions taken in close to real time** (<30 mins) as these are the options that are accessible to ENCC engineers.

Actions taken on long notice units are therefore excluded as these actions are typically taken to ensure sufficient margin is available over peak periods.

We are investigating skips behind constraints, but these are not currently considered.

Non-BM actions are currently out of scope, including:

- Interconnectors & other BSAD (Balancing Services Adjustment Data)
- Ancillary services

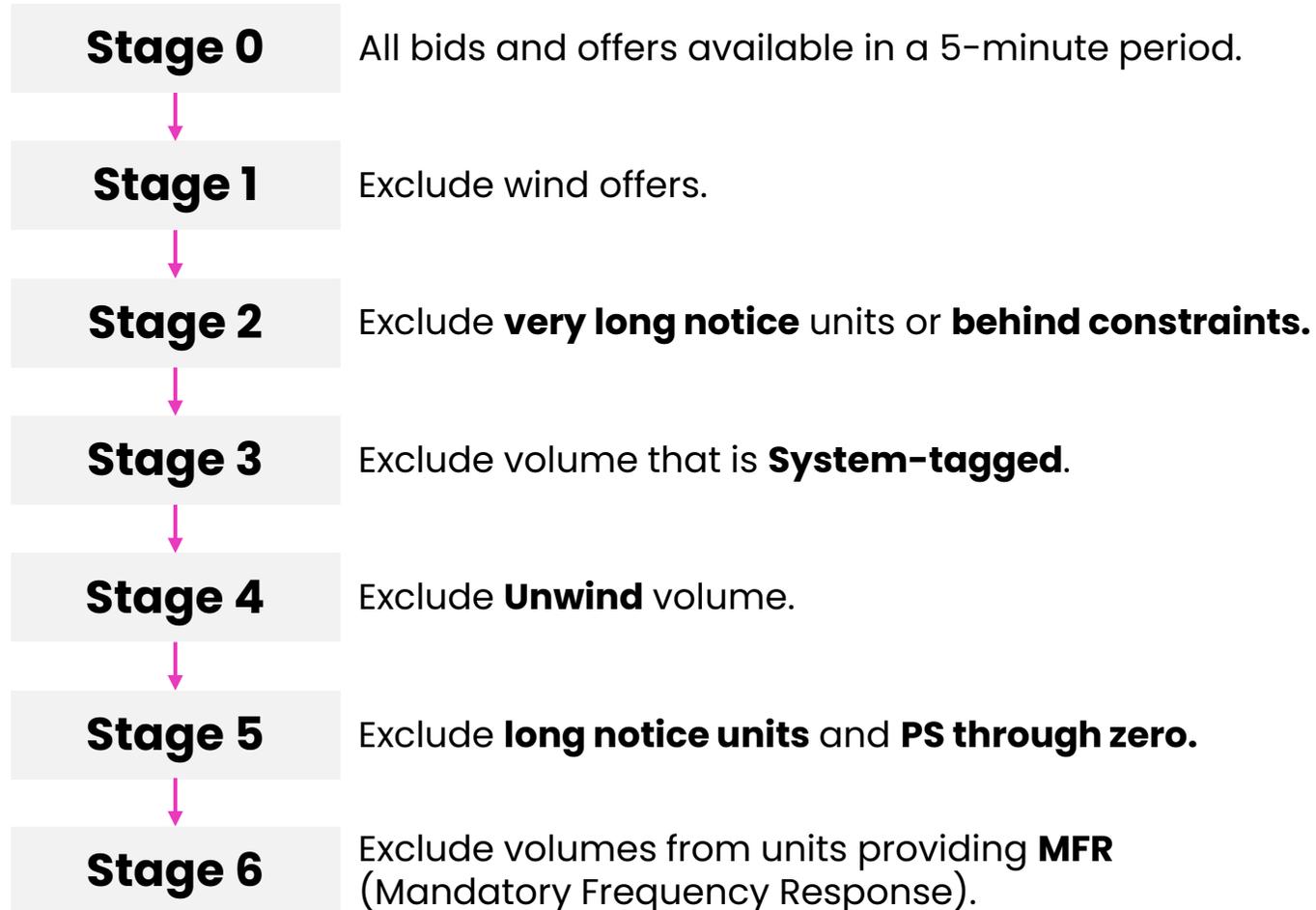
Full details about the skip rate methodology and exclusions can be found [here](#).

Exclusions refresher

Slido Code # DTP

Exclusions are made because **not all units can be dispatched in real time.**

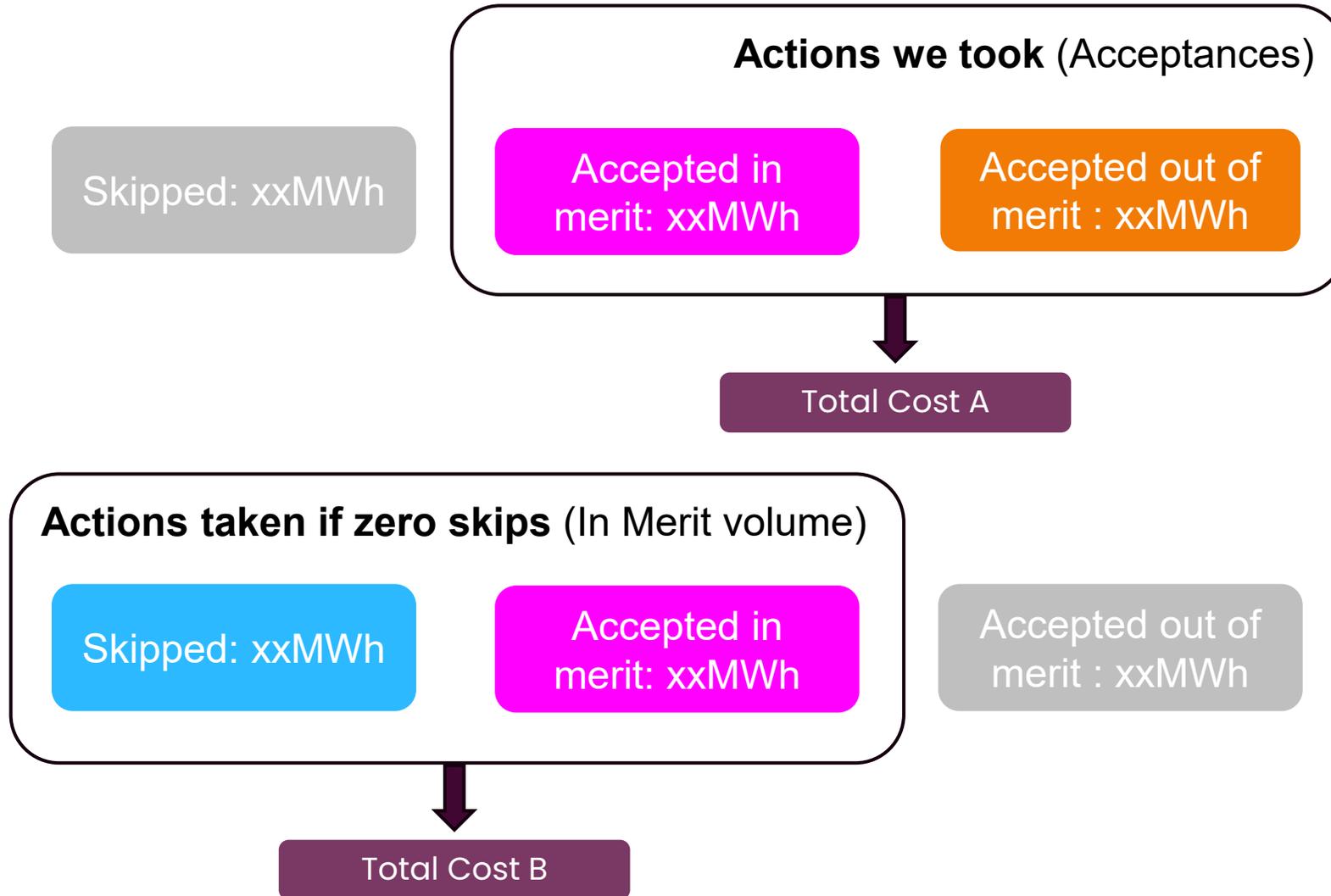
Note: The stages **do not align** to our operational processes.



| Stage | Accepted Vol (GWh) | Skipped Vol (GWh) |
|--------------------------|--------------------|-------------------|
| 0 | 22.6k | 14.5k |
| 1 | 22.6k | 12.2k |
| 2 | 12.3k | 6.6k |
| 3 | 8.9k | 4.3k |
| 4 | 8.9k | 4.2k |
| 5 | 5.0k | 2.0k |
| 6 | 3.8k | 1.4k |
| Skips behind constraints | | |
| | 13.7k | 7.7k |

Cost of Skips is based on...

Slido Code # DTP



Cost of Skips = A-B
Based on Stage 6 of Skip Rate Methodology

Cost Methodology

There are many aspects that could be considered when calculating the cost of skips. We investigated how these could be implemented and decided that **keeping the methodology simple was a high priority.**

We have therefore **not** accounted for:

- Interdependency of time periods
 - Taking a skipped unit now would change what is available in future
 - Batteries are limited duration assets and may not be able to cycle continuously to deliver all the skipped volume*
- Economic skips
 - A unit may be skipped now because using the unit later is more cost effective
- Impact on secondary markets
 - Actions taken in the BM may affect secondary markets

This means the cost of skips shown here is very likely an over-estimate, but is transparent and replicable by stakeholders

*We undertook initial analysis on battery capping which showed that capping batteries to 3 cycles / day had a very small impact on cost.

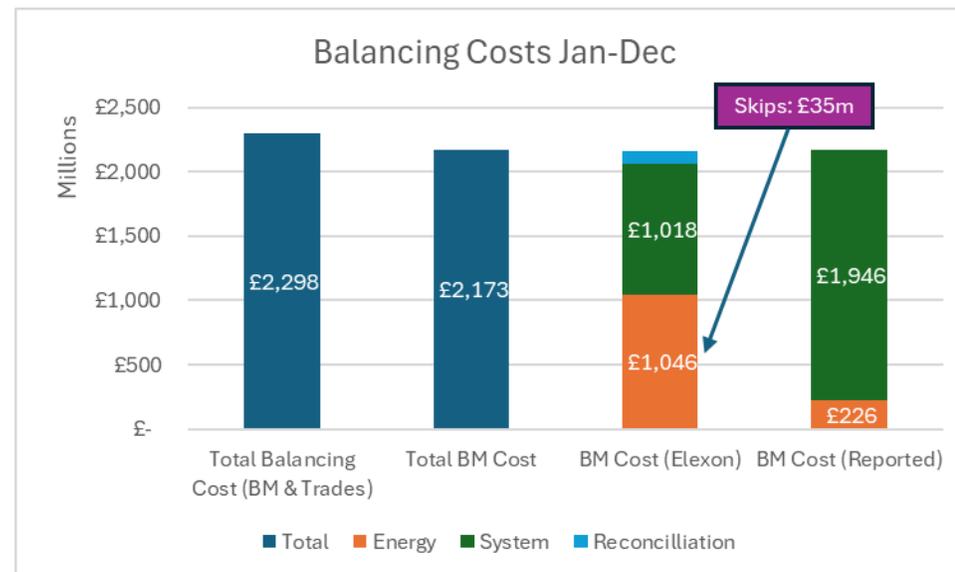
Cost Analysis: Data

Slido Code # DTP

- We have calculated the cost of skips based on the new **stage 6 dataset** which includes an additional exclusion for units providing Mandatory Frequency Response (MFR).
- This exclusion addresses one of the limitations identified by LCP Delta when the method was developed.
- The logic behind this exclusion was discussed at the stakeholder forum in May where there was general support for the change and therefore this has been implemented.

Cost of energy balancing skips

- We have analysed the cost of skips (stage 6, all technologies) for January to December 2025
- Cost of energy balancing skips ~ **£2.9m per month**
- **This is likely an overestimate due to limitations**
- To give context, this is **3.5%** of energy balancing costs in the BM

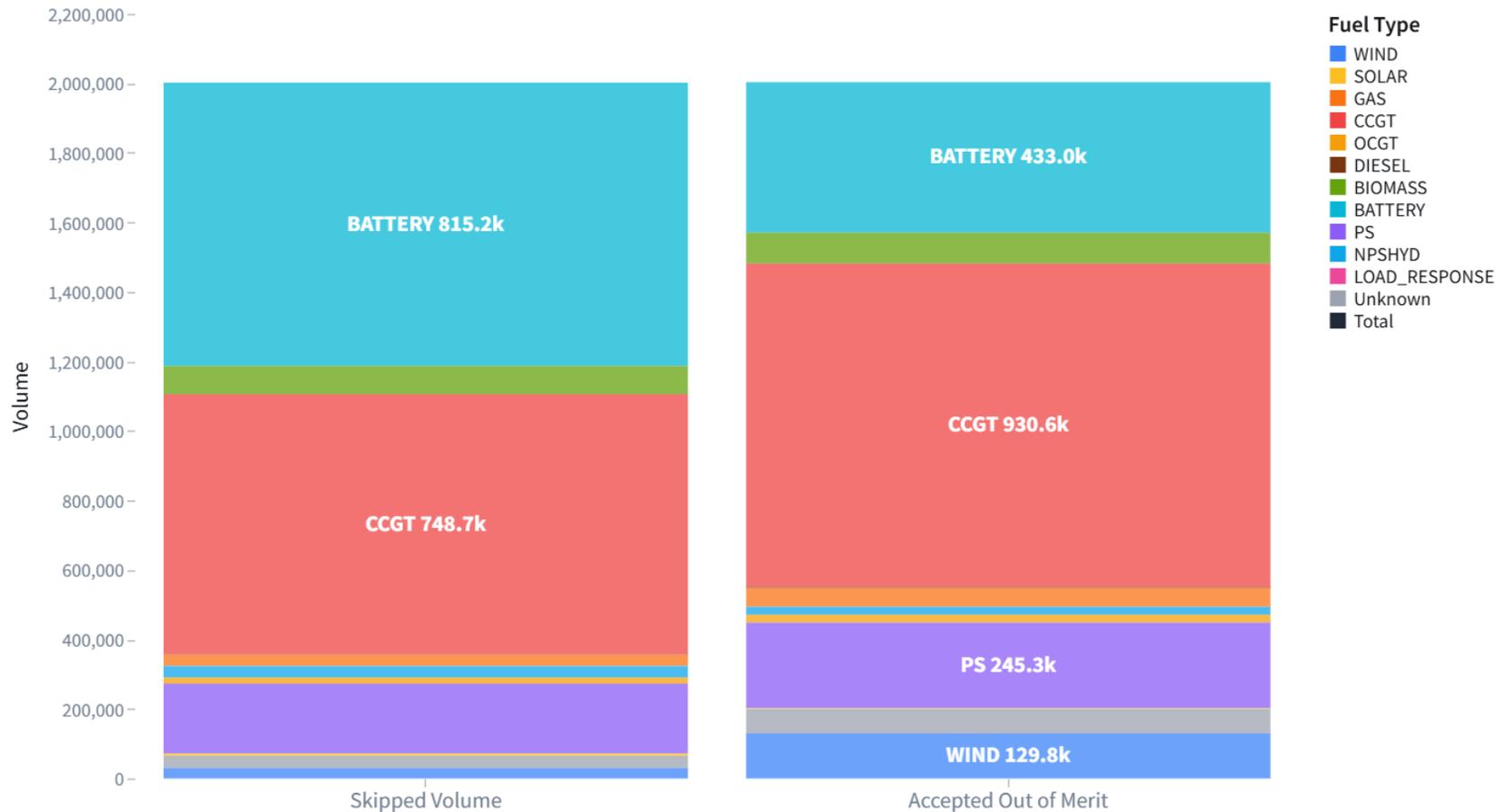


Skipped Volume vs Accepted Out Of Merit Volume

Slido Code # DTP

January – December 2025

Every MW of skipped volume must have an equivalent MW of accepted out of merit volume

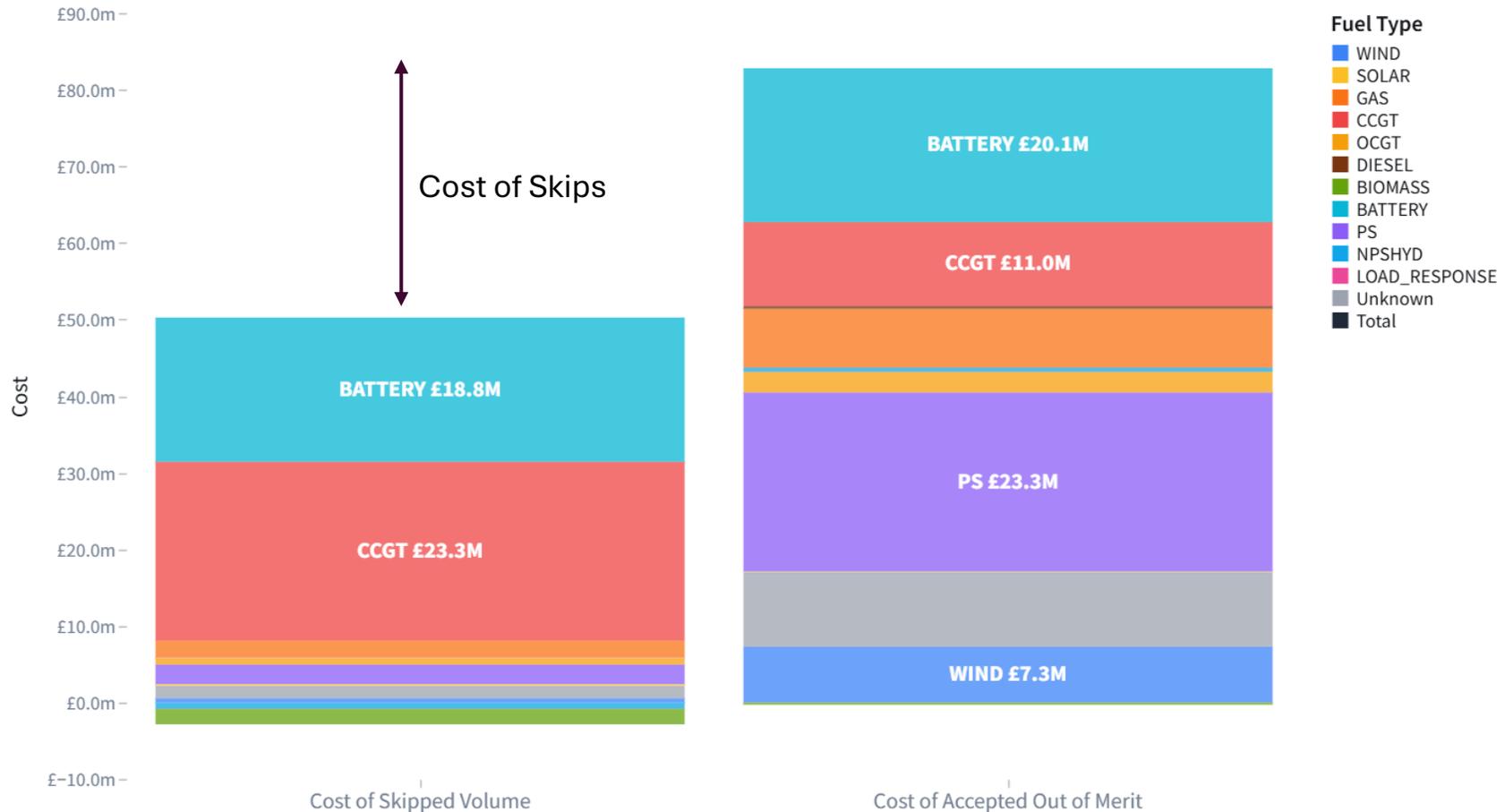


All technologies aside CCGTs receive more revenue from out of merit acceptances than if skips were zero

Slido Code # DTP

January – December 2025

Accepted out of merit volume is always more expensive than the equivalent skipped volume



External Assurance

Slido Code # DTP

We commissioned LCP Delta to independently undertake both qualitative and quantitative assurance of our analysis:

Qualitative assurance:

- Confirm that NESO's approach has been implemented as intended and is logically sound
- Provide a list of limitations to NESO's analysis, and where possible indicate whether these result in costs being under or over estimated
- Provide recommendations on potential improvements / extensions to the analysis

Quantitative assurance:

- Independently calculate the change in balancing costs associated with skips
- This is only calculated for stage 6 of NESO's skip rate methodology, and assumes all volume and price data provided by NESO is correct

LCP confirmed **our approach is appropriate and proportionate**, and that our analysis was accurate. They highlighted that key limitations – such as treating each time period independently and assuming perfect foresight – mean **our cost estimate is likely an overestimate**. The full report will be published on our website.

Note: this assurance work covered January – September 2025.

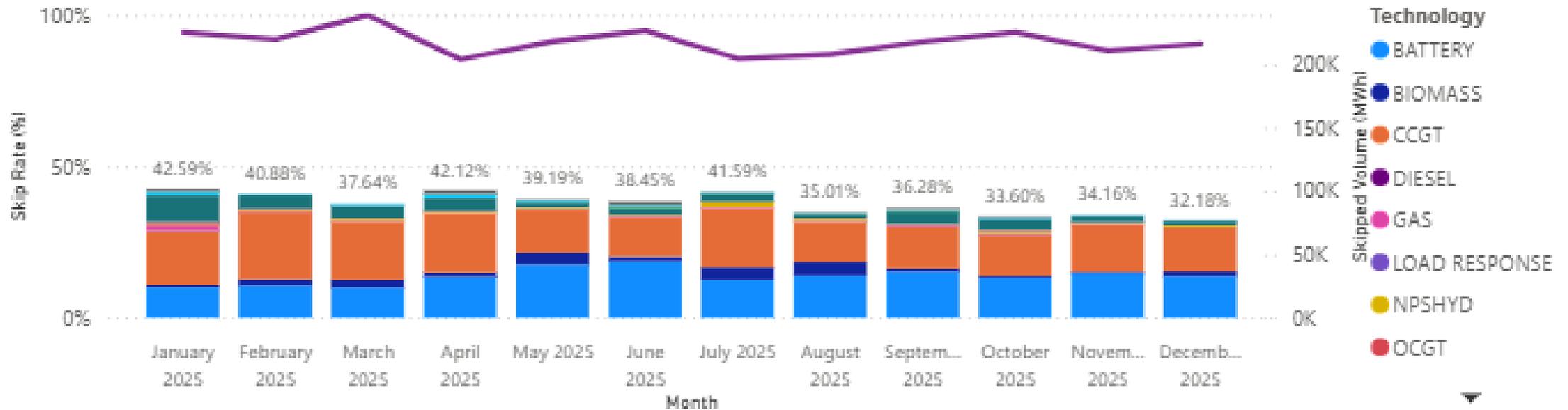
Questions and Feedback

Breakout Skip Rate reduction target

Skip rates have slowly reduced by circa 10 percentage points since January 2025 and are currently 32%

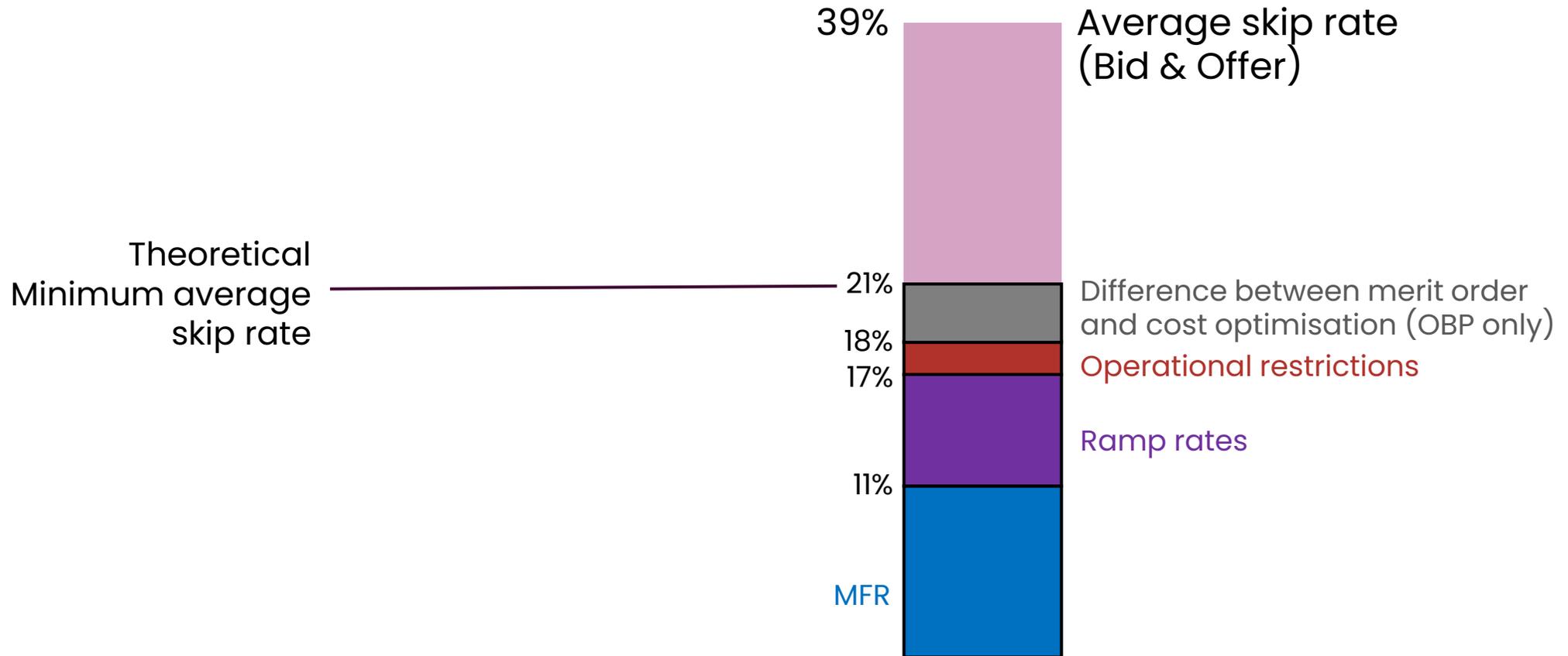
Slido Code # DTP

Relative-Technology Skip Rate and SkippedVolume by Month and Technology



There is a minimum level of skips that can be achieved. Our current understanding suggests that this is at least 21%

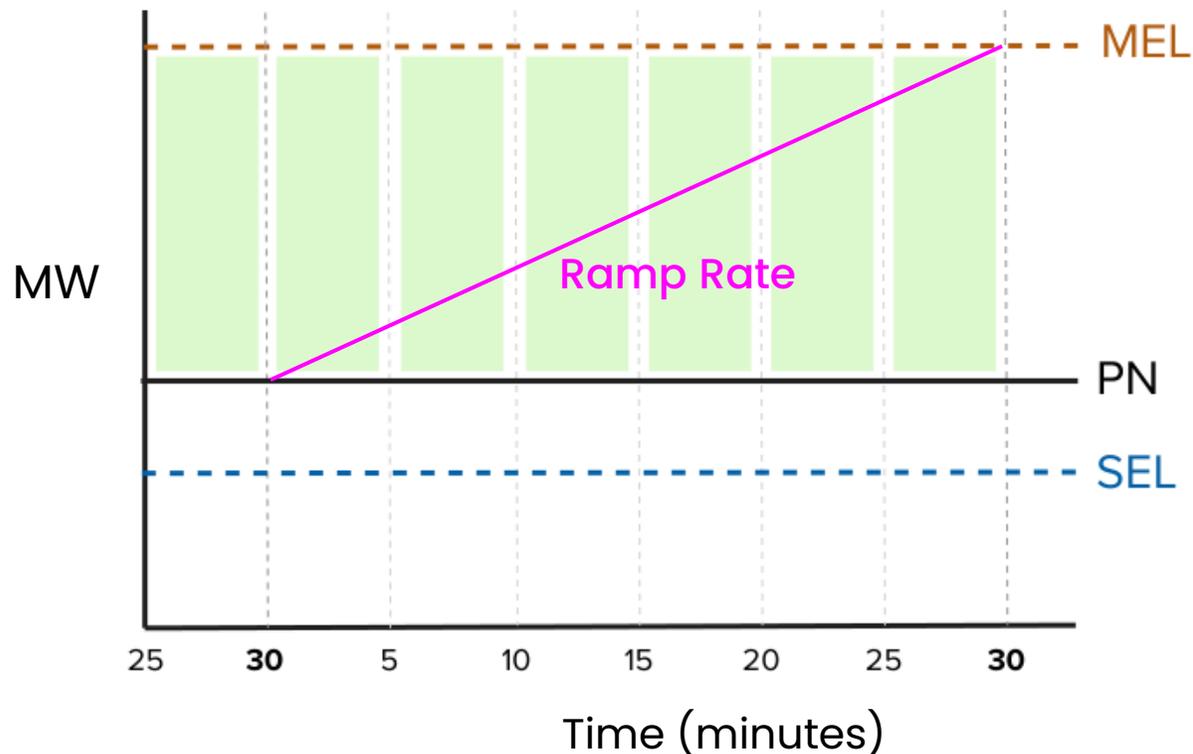
Slido Code # DTP



These are indicative values based on simplified analysis with limited data.

Example 1 – Ramp Rates

We do not account for ramp rates when calculating feasible volume.



The figure is an example of the volume that is assumed to be available in a particular scenario.

- The green areas show feasible offer volume.
- For units with non-instantaneous ramp rates, this volume is not feasible in practice.
- The pink line represents a maximum ramp rate.

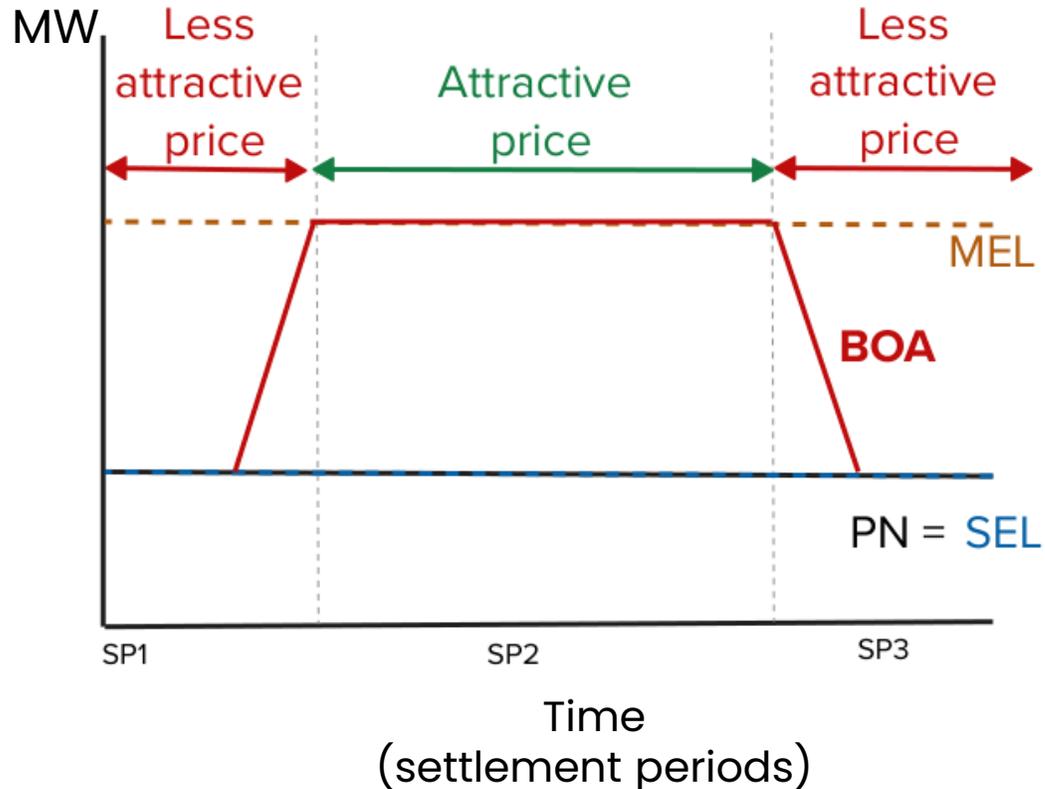
Conclusion: not accounting for ramp rates leads to skipped volume that may not have been accessible to the control room.



Example 1 – Ramp Rates

Utilising low prices

The figure shows a unit with PN = Stable Export Limit (SEL), a more attractive Offer price for settlement period 2 (SP2) and available offer volume up to Maximum Export Limit (MEL).

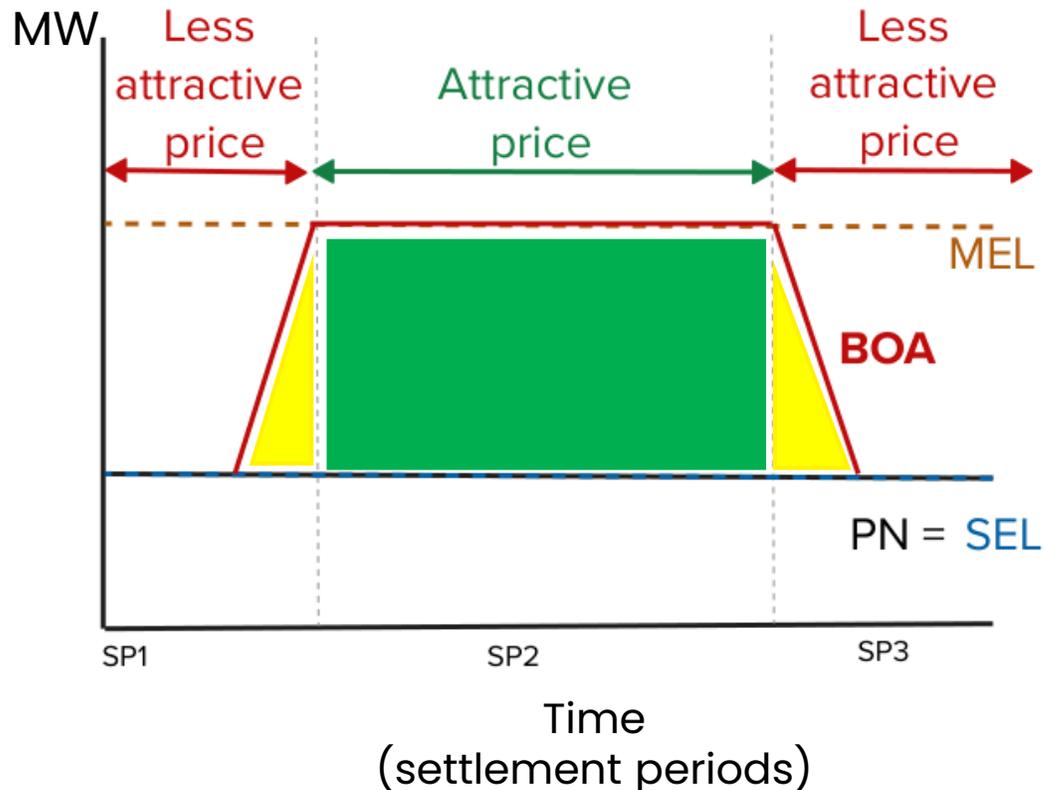


We aim for lowest total cost of energy, which may result in a small volume being accepted at a higher price.

Example 1 – Ramp Rates

Utilising low prices

The figure shows a unit with PN = Stable Export Limit (SEL), a more attractive Offer price for settlement period 2 (SP2) and available offer volume up to Maximum Export Limit (MEL).



We aim for lowest total cost of energy, which may result in a small volume being accepted at a higher price.

This leads to instructions shown as **accepted out of merit** in settlement periods 1 and 3, potentially causing higher skipped volume.

BOA = Bid Offer Acceptance

We sought stakeholder views on the aim of a target – cost and technology type parity were common themes

Slido Code # DTP

Stakeholders' views:

- Majority of stakeholders believe cost of skips and consumer cost is important
- Technology type skip rate parity was a common theme
- Potentially a battery specific rate or aspiration to get to the same level as fossil fuels
- Owners/operators want to understand and predict when skips are likely to occur
- Maintaining system security should feature

Taking into account stakeholder views and our understanding of skips, we are proposing an initial skip rate target ahead of the implementation of GC166

| Target | Proposed Measure | Limitations |
|---------------------------|--|---|
| Skip Rate % (PSA Stage 5) | ~30% target Threshold 30%, Stretch 26% | <p>A lower skip rate does not guarantee a lower cost</p> <p>Reduction efforts could favour largest skipped volumes</p> <p>Current methodology will be impacted by implementation of GC0166, so propose this as a temporary target until summer 2026</p> |

Breakout Skips Behind Thermal Constraints



Recap of Existing Energy Method

Slido Code # DTP

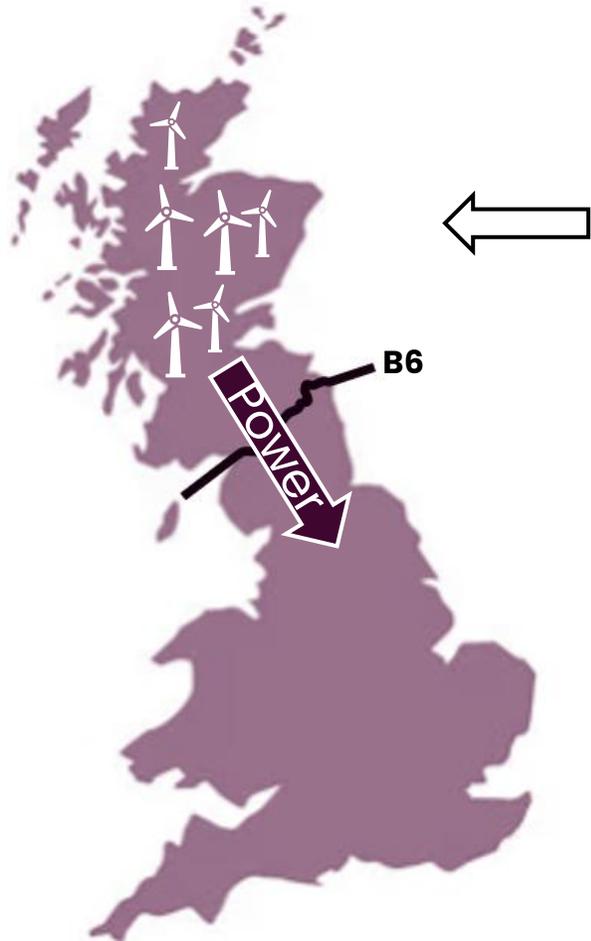
- Units that are inaccessible to the control room in real time are excluded from consideration.
- All system actions (including those taken to manage thermal constraints) are excluded from consideration.
- The remaining units are then assessed at a **5-minute granularity**.
- Within any 5-minute period, the total volume of energy actions made by the control room are summed (separately for bids and offers). This sum is called the **imbalance requirement**.
- All feasible volume (on units that have not been excluded) is arranged in price order, and the cheapest possible units to fulfil the imbalance requirement are deemed **in merit**.
- If a unit is in merit but was not accepted by the control room, it has been **skipped**.

What are Constraints?

Slido Code # DTP

- Thermal constraints are operational limits that protect physical infrastructure. They limit the power that can flow across physical wires and cables, and can be visualised with theoretical lines drawn across the UK.
- An **active constraint** is a constraint that control engineers are currently taking actions to reduce the flow across. It is affecting dispatch decisions.
- **Export constraints** limit the power that can flow out of a region. They often surround areas of high generation and low demand, such as Scotland on a windy day.
- **Import constraints** limit the power that can flow into a region. They often surround areas of high demand and low generation, such as large cities.
- Constraints can also be due to voltage or stability. They have less impact on balancing costs and are not in the scope of this project.

Import and Export Constraints



Export constraints

- Limit the power that can flow **out** of a region
- Surround areas of high generation and low demand

Import Constraints

- Limit the power that can flow **into** a region
 - Surround areas of high demand and low generation





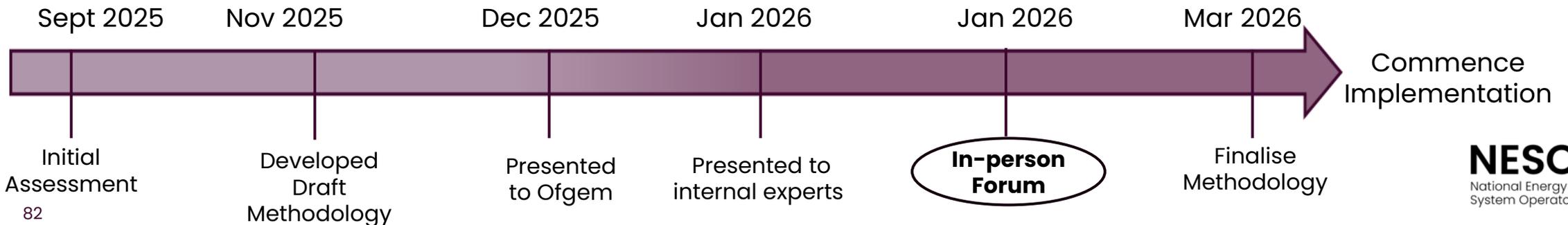
Our Aim

Provide transparency on dispatch decisions made for units behind active thermal constraints

Objectives

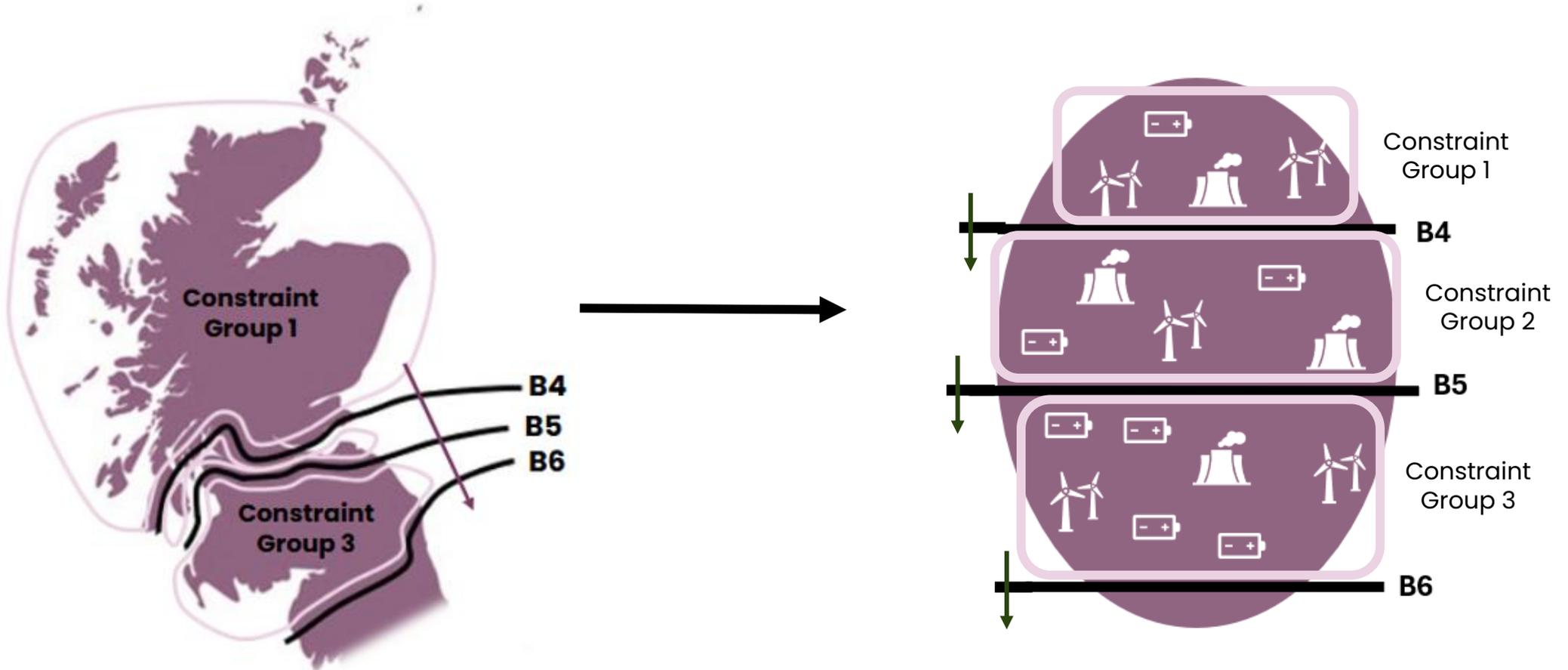
- Identify and analyse skips that occur behind thermal constraints.
- Develop a methodology to assess and measure skips within thermal constraint boundaries, accounting for:
 - Nested constraints
 - Complimentary constraints

Timeline



The Method: Defining groups

Slido Code # DTP



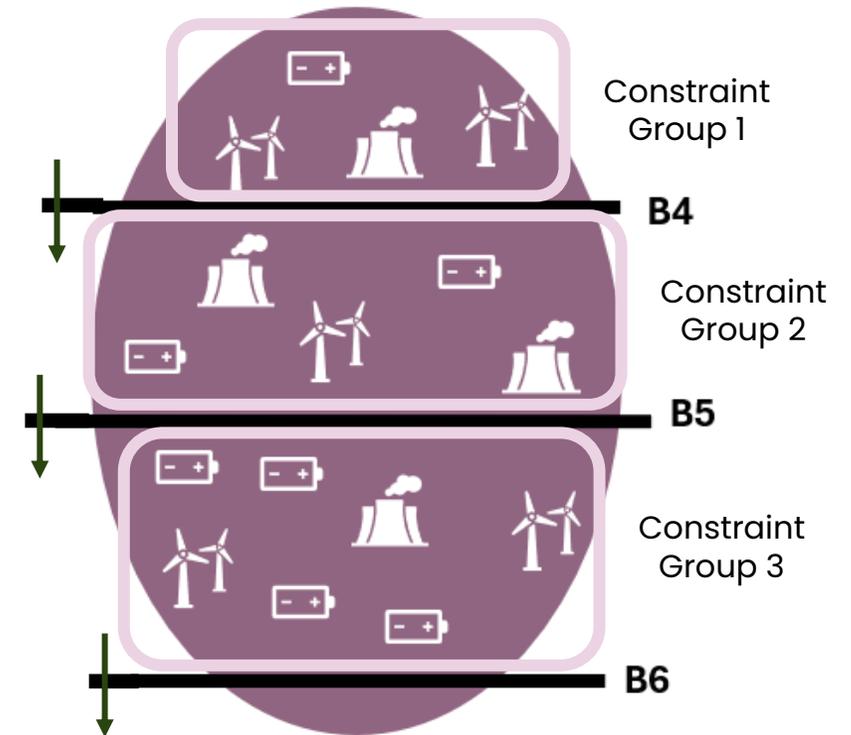
The boundary of a group is the **largest shape** you can draw without crossing any **active constraints**.

The Method: An Overview

Slido Code # DTP

The following method is applied at a **5-minute granularity** within individual groups, and separately for bids and offers. Only bids are considered behind export constraints and only offers are considered behind import constraints.

1. All feasible volume inaccessible to the control room is excluded from the analysis.
2. The total system volume of bids/offers accepted by the control room within the given group is calculated (the group imbalance requirement)
3. The cheapest feasible volume that could have fulfilled the group imbalance requirement is deemed 'in merit.'
4. Any volume deemed in merit but not accepted by the control room is considered skipped.



Assumption: All available generators have the same effectiveness in managing constraints.

Example

Feasible merit stack



- Calculated at a **5-minute granularity**
- Calculated for bids and offers separately
- Calculated for each group separately

Key:

-  Feasible volume of 1 MWh - not accepted by the control room
-  Feasible volume of 1 MWh - accepted by the control room

Example

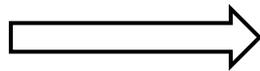
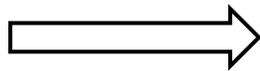
Key:

-  Feasible volume of 1MWh - not accepted by the control room
-  Feasible volume of 1MWh - accepted by the control room
-  Volume of 1 MWh not accessible to the control room

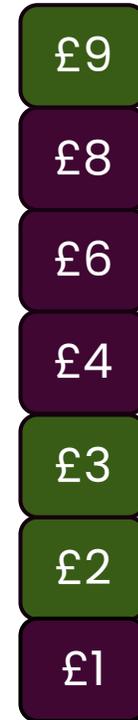
Feasible Merit Stack



Step 1: Exclude volume inaccessible to the control room



New Feasible Merit Stack



Example

Key:

-  Feasible volume of 1MWh - not accepted by the control room
-  Feasible volume of 1MWh - accepted by the control room

Feasible Merit Stack



Step 2: Calculate the total accepted volume of bids/offers within one group (the **group imbalance requirement**)

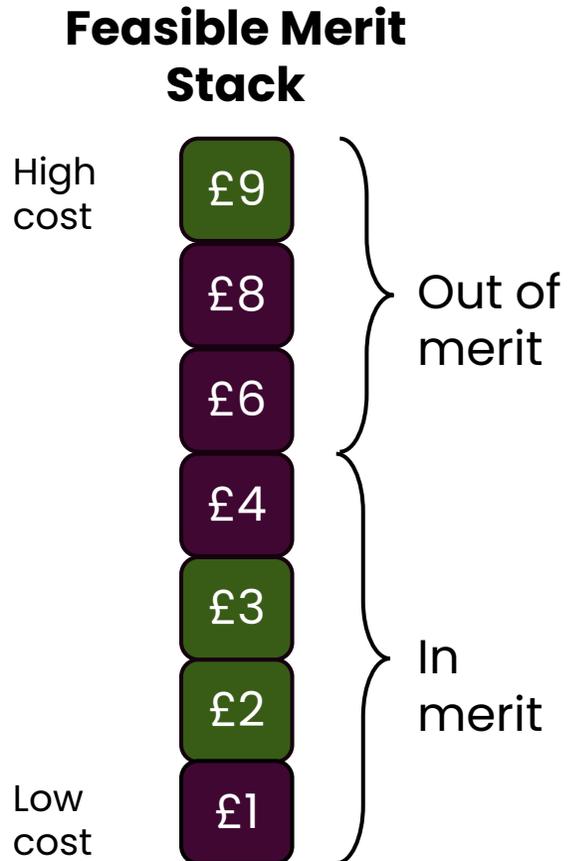
$$\text{£1} + \text{£4} + \text{£6} + \text{£8}$$

Group imbalance requirement = 4 MWh

Example

Key:

-  Feasible volume of 1MWh - not accepted by the control room
-  Feasible volume of 1MWh - accepted by the control room



Step 3: The cheapest volume that can fulfil the group imbalance requirement is deemed 'in merit'

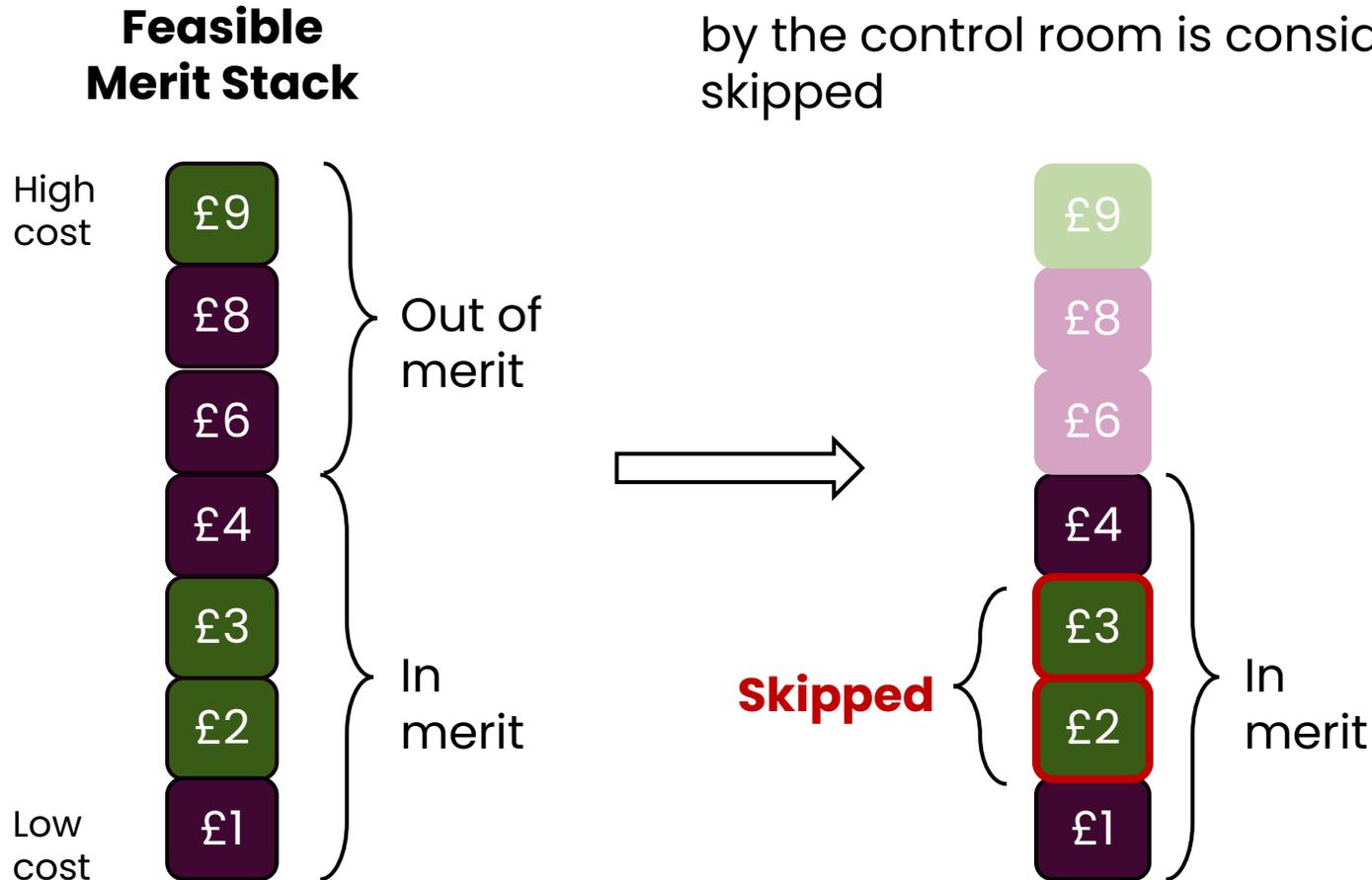
Group imbalance requirement = 4 MWh

Example

Key:

-  Feasible volume of 1MWh - not accepted by the control room
-  Feasible volume of 1MWh - accepted by the control room

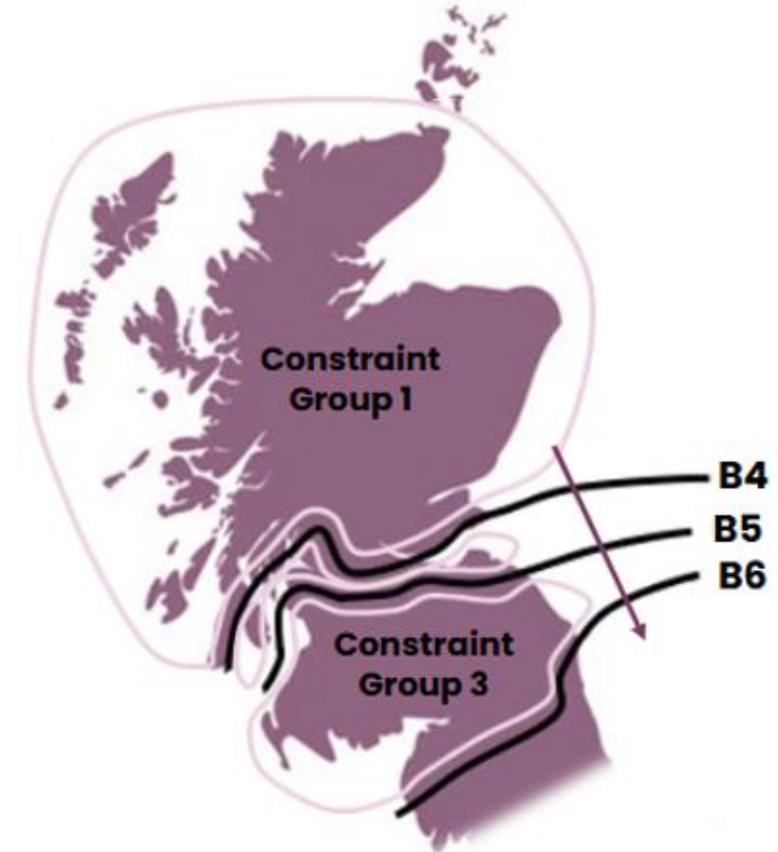
Step 4: Any volume that was both deemed in merit and not accepted by the control room is considered skipped



Nested Constraints

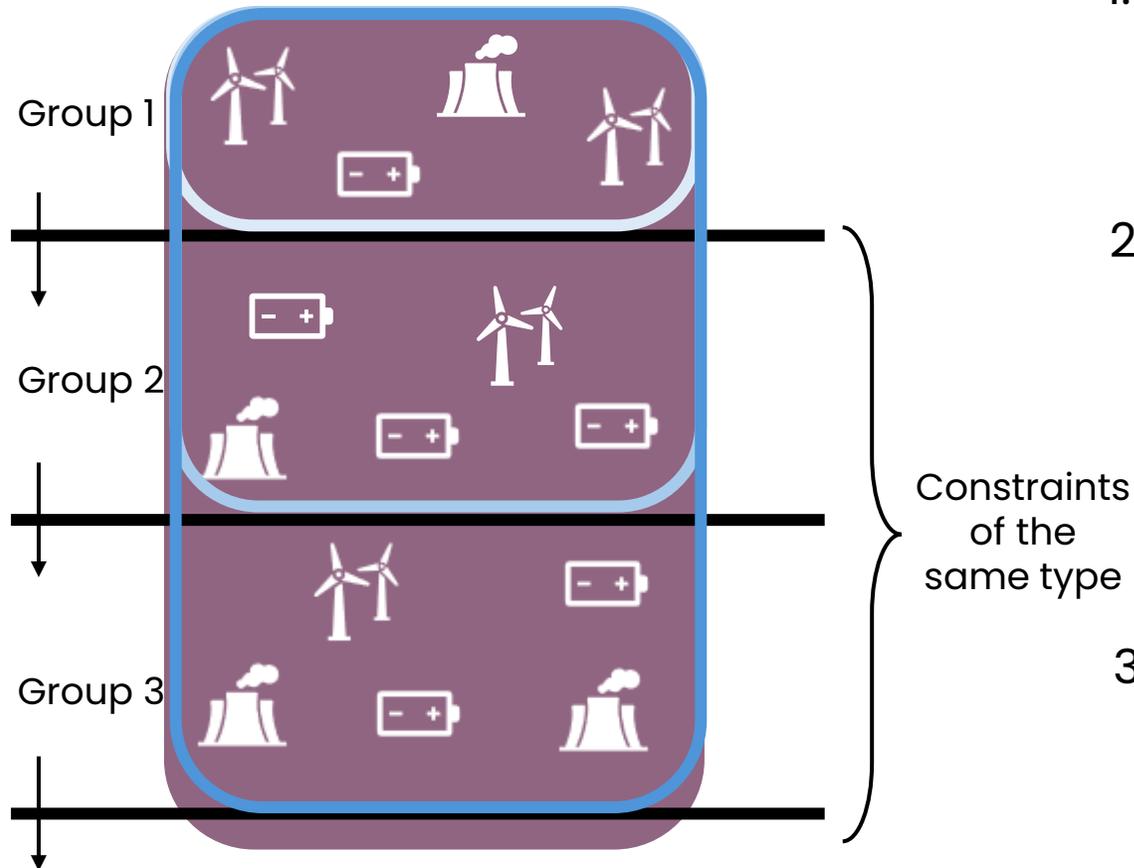
Slido Code # DTP

- Nested constraints are more complex, as actions taken to affect one constraint boundary may affect others.
- The example to the right shows three nested export constraints.
- Any actions taken in constraint group 1 to manage B4 also affects both B5 and B6.
- Similarly, any actions taken in constraint group 2 to manage B5 also affects B6.
- This is true whether nested constraints are import, export, or mixed.



The Method – Nested Groups

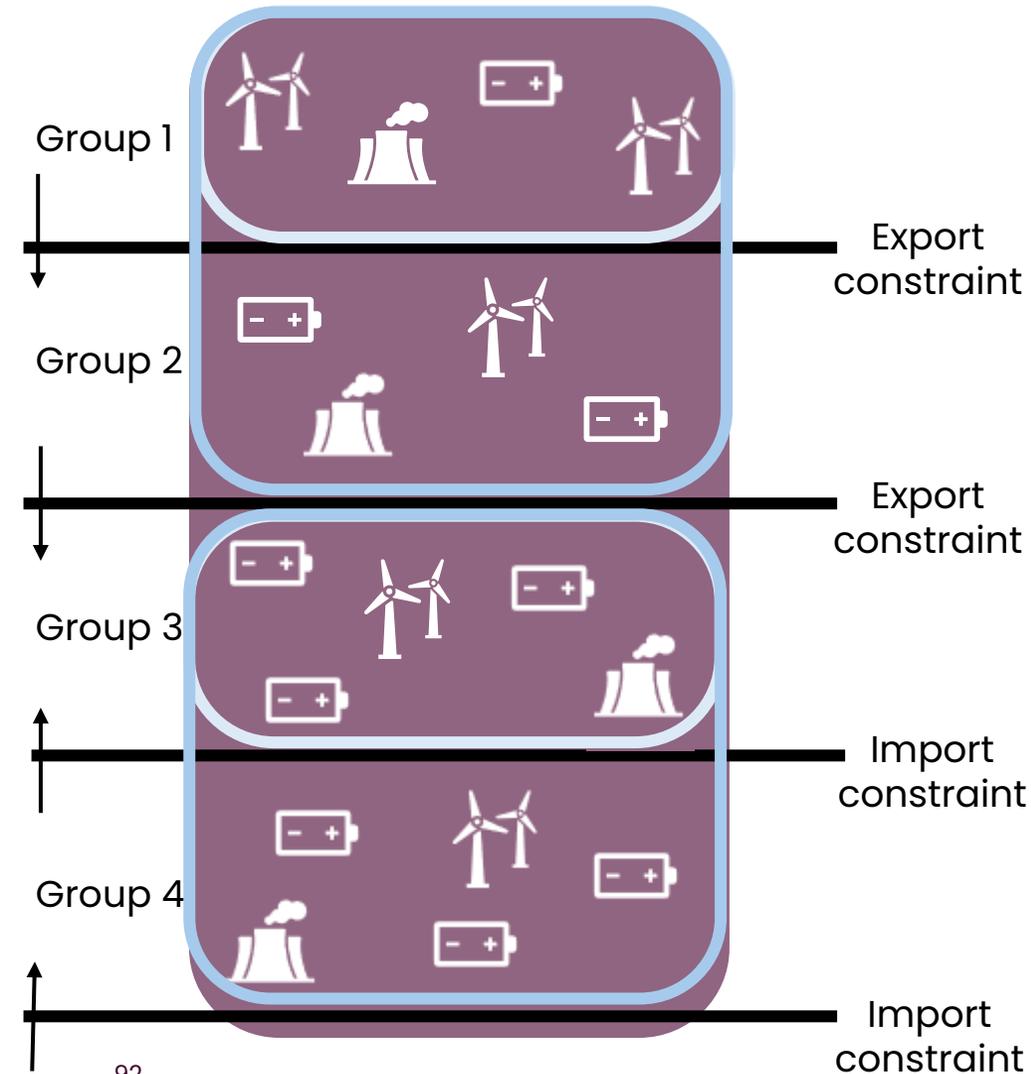
Slido Code # DTP



1. Calculate the skipped volume in the most constrained group as normal. (The most constrained group is the group behind the highest number of active constraints).
2. Calculate the skipped volume in the 2nd most constrained group:
 - Calculate the imbalance requirement using only units in group 2.
 - Create the feasible merit stack from all feasible volume in group 2, and any remaining volume in group 1.
3. Repeat the process with the next most constrained group in the same way:
 - Calculate the imbalance requirement using only units in group 3.
 - Create the feasible merit stack from all feasible volume in group 3, and any remaining volume in groups 1 and 2.

The Method – Mixed Nested Groups

Slido Code # DTP

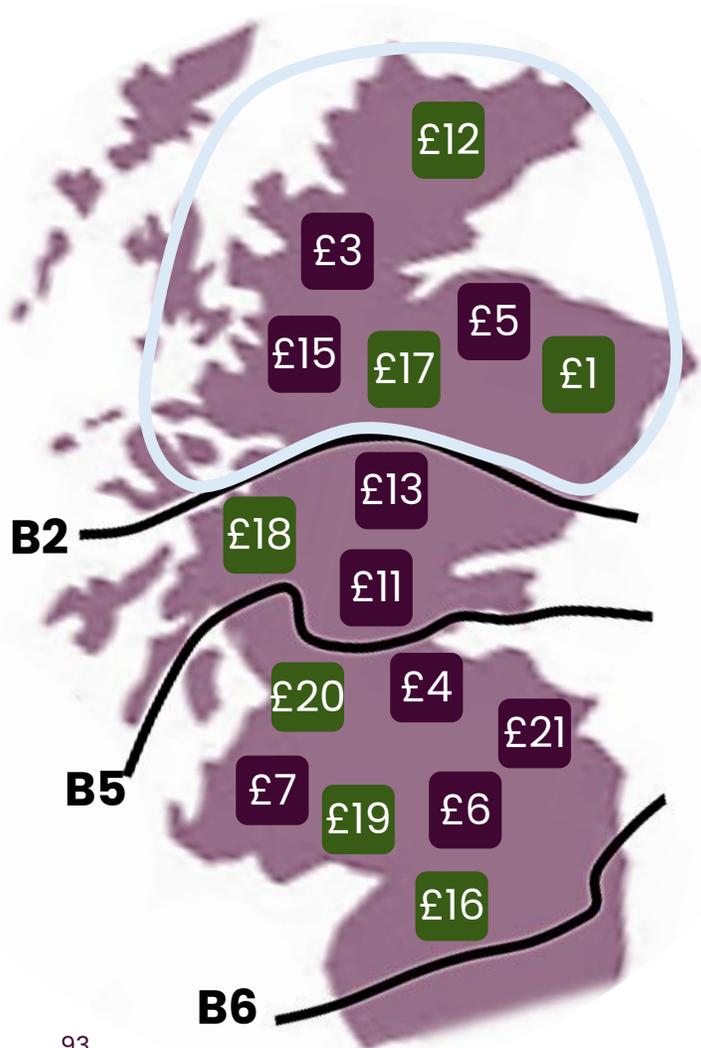


1. As before, begin with the most constrained group.
2. As before, calculate the skipped volume in the 2nd most constrained group:
 - The imbalance requirement is the sum of accepted volume in group 2
 - The feasible merit stack is formed from all feasible volume in group 2, and all remaining feasible volume in group 1.
3. Group 3 is behind a different type of constraint to the previous ones, so the 'looping' must start again.
4. Group 4 is behind the same type of constraint as group 3, so they are considered together.
 - The imbalance requirement is the sum of accepted volume in group 4
 - The feasible merit stack is formed from all feasible volume in group 4, and all remaining feasible volume in group 3

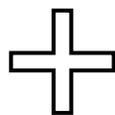
Example: Nested Export Constraints

Key:

- Feasible bid of 1MWh - not accepted by the control room
- Feasible bid of 1MWh - accepted by the control room as a system action

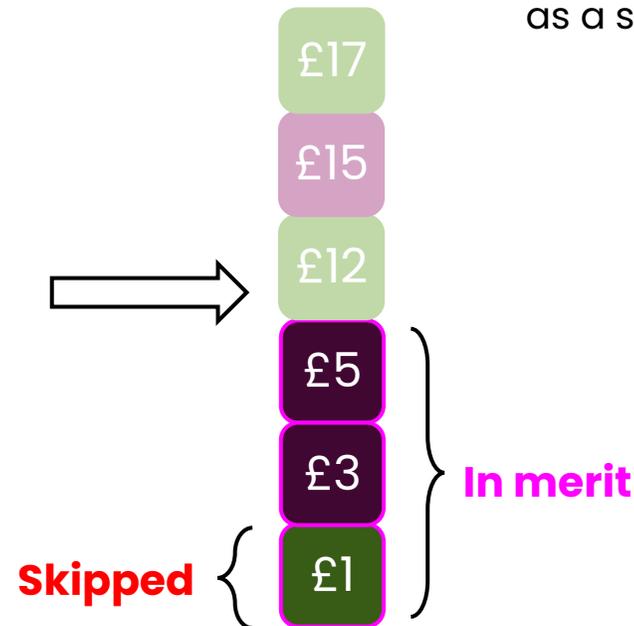
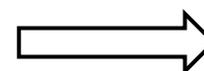


B2 Boundary Feasible Merit Stack

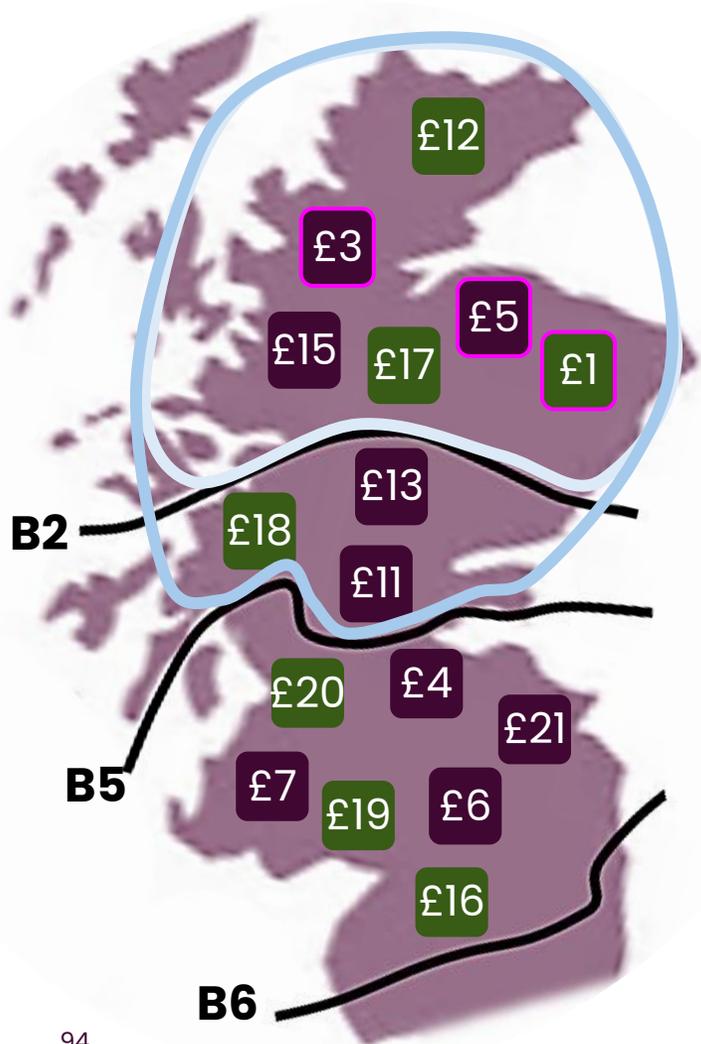


Calculated at 5-minute granularity

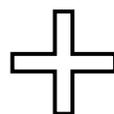
B2 group imbalance requirement = 3 MWh



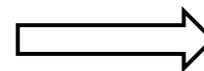
Example: Nested Export Constraints



B5 Boundary Feasible Merit Stack



B5 group imbalance requirement = 2 MWh



Skipped

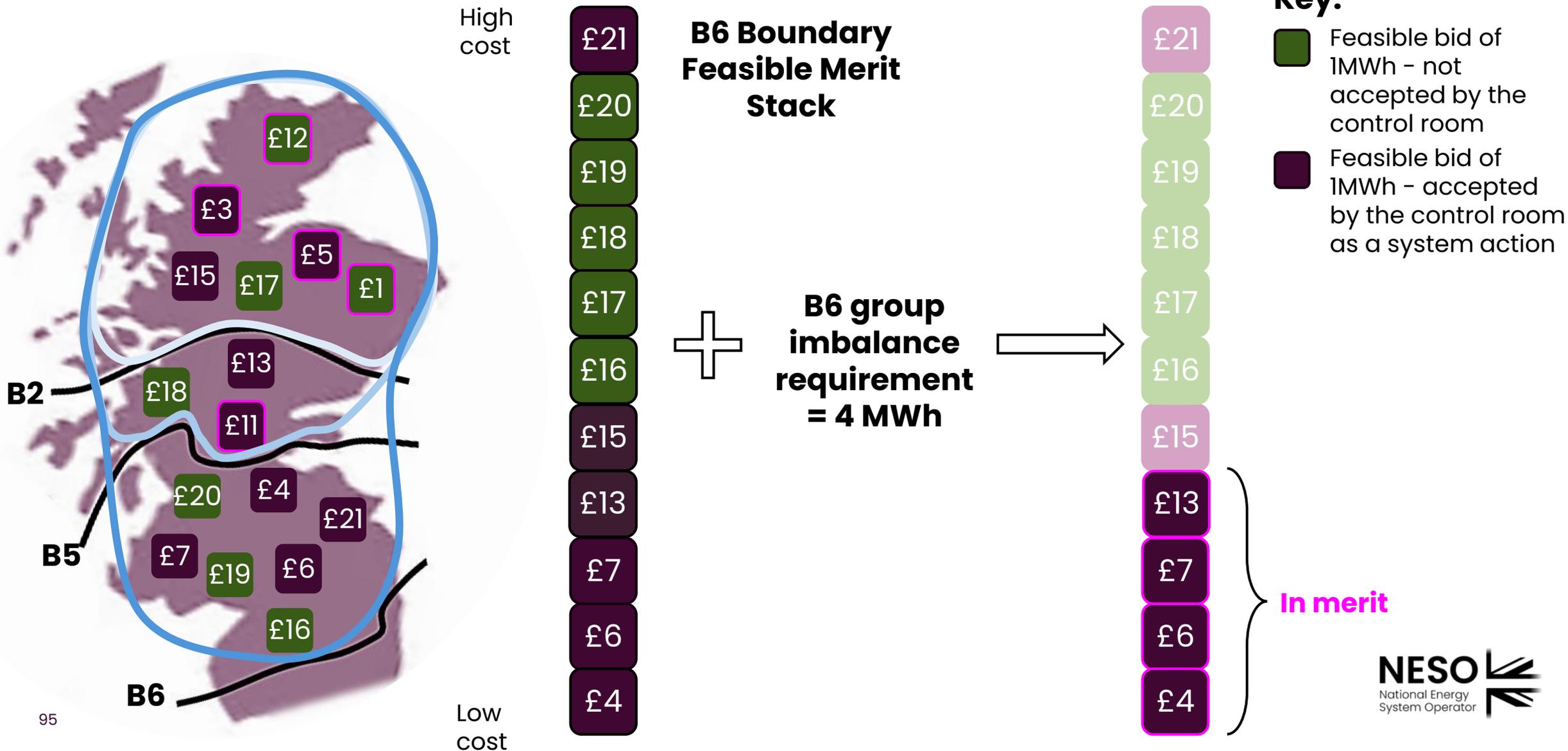


In merit

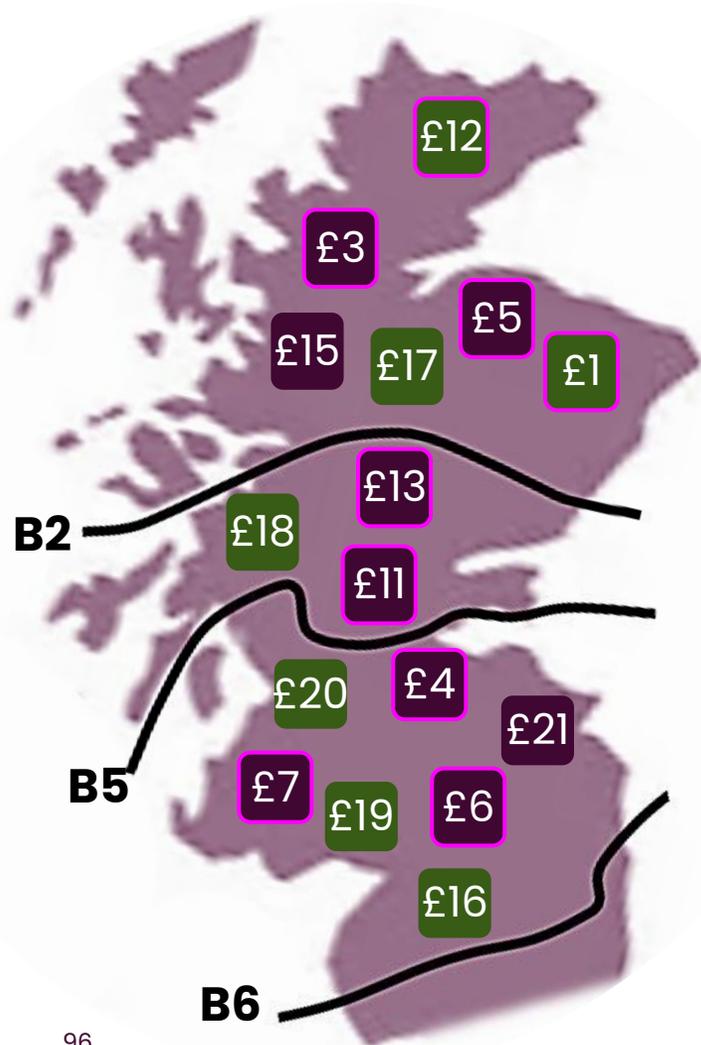
Key:

- Feasible bid of 1MWh - not accepted by the control room
- Feasible bid of 1MWh - accepted by the control room as a system action

Example: Nested Export Constraints



Example: Nested Export Constraints



Any units in merit but not accepted by the control room are skipped

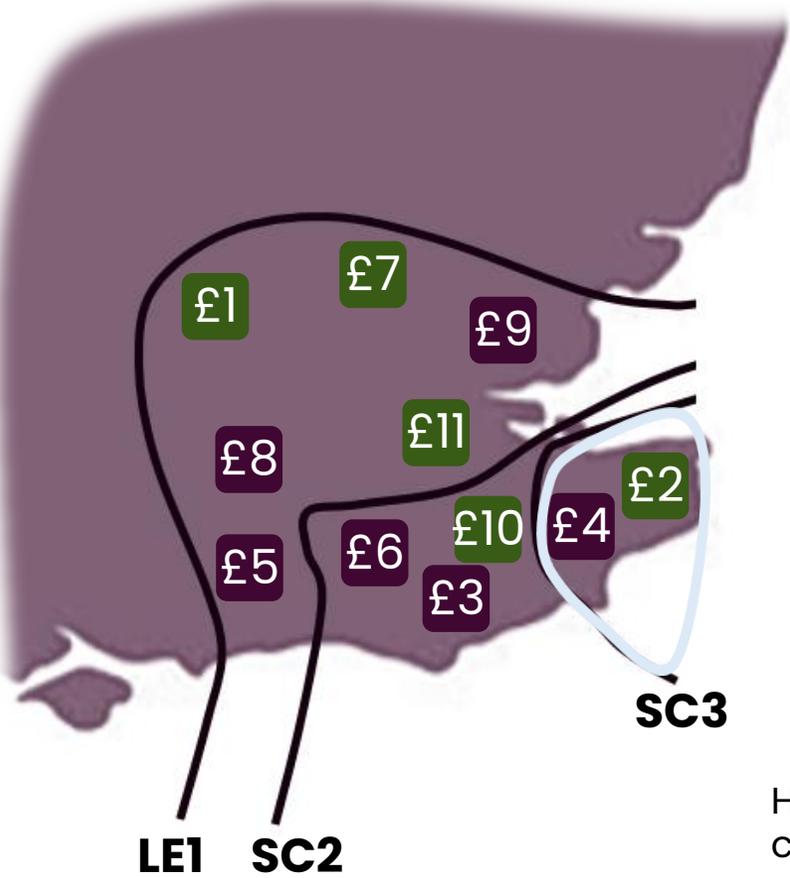
$$\text{Skip rate} = \frac{\text{Skipped volume}}{\text{Accepted volume}} = \frac{2}{9} = 22\%$$

Calculated at **5-minute granularity**

Key:

- Feasible bid of 1MWh - not accepted by the control room
- Feasible bid of 1MWh - accepted by the control room as a system action

Example: Nested Import Constraints



Calculated at **5-minute granularity**

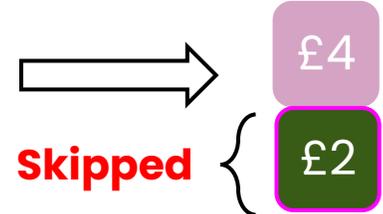
Key:

- Feasible offer of 1MWh - not accepted by the control room
- Feasible offer of 1MWh - accepted by the control room as a system action

SC3 Boundary Feasible Merit Stack



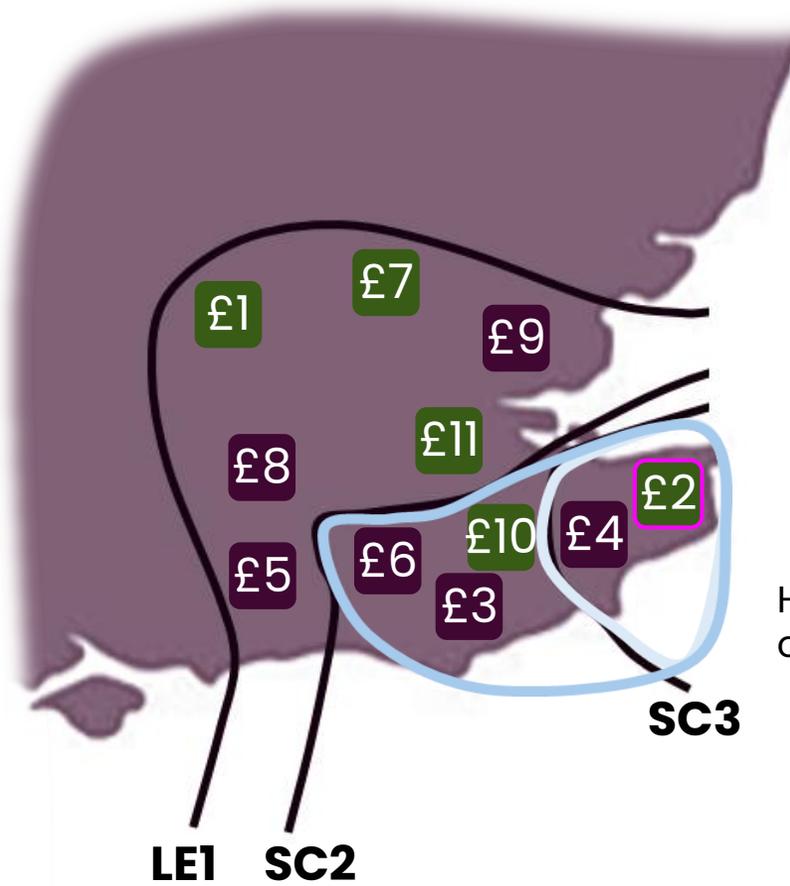
SC3 group imbalance requirement = 1 MWh



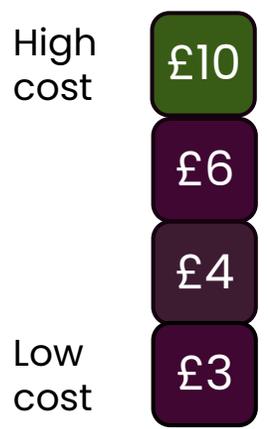
Example: Nested Import Constraints

Key:

- Feasible offer of 1MWh - not accepted by the control room
- Feasible offer of 1MWh - accepted by the control room as a system action

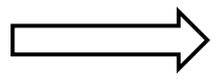


SC2 Boundary Feasible Merit Stack



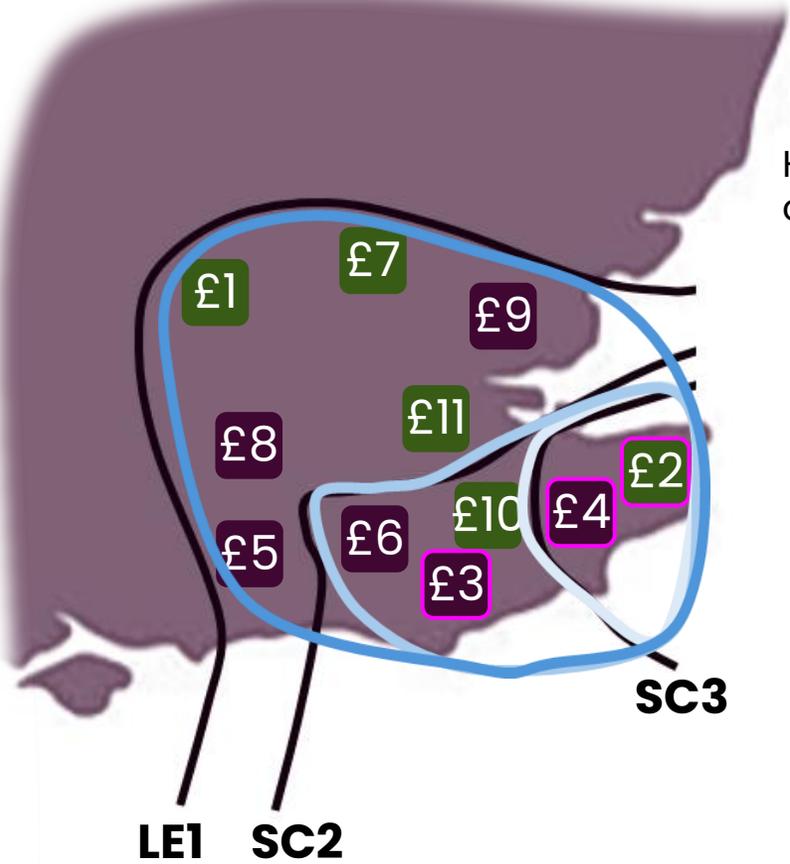
+

SC2 group imbalance requirement = 2 MWh



In merit

Example: Nested Import Constraints

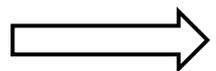


LE1 Boundary Feasible Merit Stack



+

LE1 group imbalance requirement = 3 MWh



Skipped

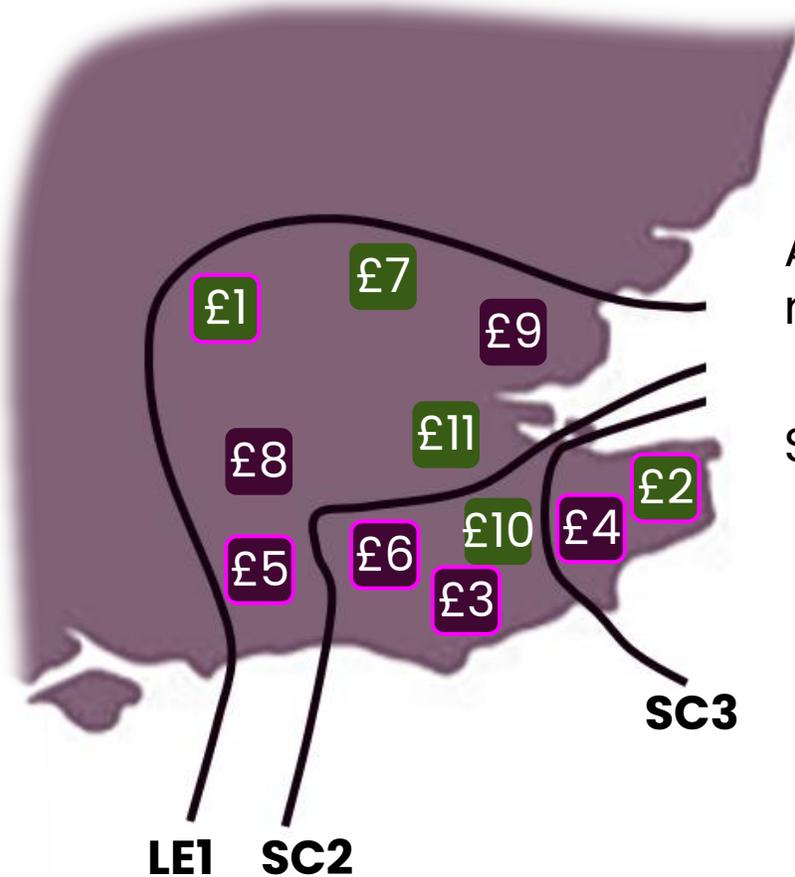


In merit

Key:

- Feasible offer of 1MWh - not accepted by the control room
- Feasible offer of 1MWh - accepted by the control room as a system action

Example: Nested Import Constraints



Any units in merit but not accepted by the control room are skipped

$$\text{Skip rate} = \frac{\text{Skipped volume}}{\text{Accepted volume}} = \frac{2}{6} = 33\%$$

Calculated at **5-minute granularity**

Key:

- Feasible offer of 1MWh - not accepted by the control room
- Feasible offer of 1MWh - accepted by the control room as a system action

The Method – Exclusions

Excluded in energy method

| Exclusion | Justification |
|---|--|
| Long notice units: MZT MNZT NDZ >= 31min | These units are inaccessible to the control room in balancing timescales. |
| Offers on wind and solar units | These technology types are weather condition dependent and therefore cannot increase output. |
| Volumes leaving a unit in an unstable position | Instructing a unit to a level between its SIL and SEL would result in the instruction being rejected. |
| All units with acceptances system tagged for voltage or inertia | Although these units were accepted for system reasons, it was not to manage thermal constraints. These actions are not within the scope of this project. |
| All units not behind active thermal constraints | Most of these actions are assessed by the existing energy method. |
| Units armed for Intertrip or MFR contracts | These units maintain a position which ensures they are able to deliver upon these contracts. If the control room changes their position, they must still pay for these contracts, despite the units being unable to deliver upon them. |

Limitations of the Method

Slido Code # DTP

| Limitation | Justification for not addressing |
|--|---|
| This method assumes pre-fault conditions. | A transmission level fault is rare, therefore a separate methodology for this case has not been developed. |
| This method does not consider some transmission limitations such as substation configuration, or the time it takes to physically switch the network. | Addressing these considerations would result in a small increase to accuracy but greatly increase complexity. |
| Where the control room has under/overcorrected a constraint, this method will follow suit. | The correct level to manage a constraint to is a very complex and continually changing problem. For simplicity we have chosen to assume that the correct level has been chosen. |
| Misalignment between energy method and thermal constraints method in the case of over/under corrected constraints. | This is due to a difference in approach between the two methods in allocating system volume. |

Questions and Feedback

Breakout GC0166 Update

GC0166 Grid code changes

Slido Code # DTP

- Ofgem have approved changes to the grid code modification GC0166. The change will result in the introduction of new parameters that will allow better use of electricity storage modules in the balancing mechanism.
- Start date for the above grid code change – 5 November 2025
- It is expected NESO will be ready to use GC0166 data from **June 2026**
- NESO will agree a time and date to switch each unit from current arrangement to GC0166. This will be done unit by unit and not all at once.
- Further information on the GC0166 can be found [here](#).
- OFGEM decision can be found here :
<https://www.ofgem.gov.uk/publications/gc0166-grid-code-changes>

Grid code definition

Slido Code # DTP

BC1.A.1.11 Electricity Storage Module Future State of Energy (FSoE) Modelling

BC1.A.1.11.1 **BM Participants** who own and/or operate **Electricity Storage Modules** must provide asset specific relevant data when requested by **The Company** based on bilateral discussions to allow for modelling by **The Company** of **Future State of Energy (FSoE)** and the limits of operation that an **Electricity Storage Module** must obey.

BC1.A.1.11.2 These models will be used for planning purposes beyond the end of the **Balancing Mechanism Window Period** to the end of the time when interim data is available to **The Company**. **The Company** may use such models to simulate the effect of **Bid-Offer Acceptance** and a **Physical Notification** on the **Future State of Energy (FSoE)**. The requirements for **System Ancillary Services** and/or **Commercial Ancillary Services** within the model will be derived by **The Company** from auction data.

BC2.5.3.4 Resubmissions to Maximum Delivery Offer (MDO) and Maximum Delivery Bid (MDB) for a BM Unit may only be made following Gate Closure for a Settlement Period in the event of:

- a. The **BM Unit** no longer being able to achieve the previously stated value as a result of an unavoidable **Event**. Examples of such an **Event** include (but are not limited to) **Plant** breakdowns, or **Events** requiring a resubmission on safety grounds (relating to personnel or **Plant**); or
- b. The **Company** issuing a **Bid-Offer Acceptance (BOA)** in respect of the **BM Unit**; or
- c. The **BM Unit** fully utilising the energy reserved (or storage capacity for energy which was reserved) for delivery of **System Ancillary Services** or **Commercial Ancillary Services**; or
- d. Submission of a change to a **Physical Notification** for the **BM Unit** under BC1.4.2(a) which covers the **Settlement Period** after the **Balancing Mechanism Window Period**.
 - a. For the purposes of clarity, if a **BM Participant** doesn't submit values by 11:00 each day for the next **Operational Day** they will default to the **MDO** and **MDB** values previously submitted until updated.

Grid code GC0166

| Parameter Name | Definition |
|-------------------------------|--|
| Bid Acceptance | An acceptance by a BM Unit of a Bid-Offer Acceptance to decrease its export onto, or increase its import from, the National Electricity Transmission System , where in this context import and export are as defined in the BSC . |
| Future State of Energy (FSoE) | For each Electricity Storage Module , this is a series of MWh figures and associated times, which is calculated by The Company using the data provided under BC1.A.11.1, making up an estimated profile of the energy stored in that Electricity Storage Module . |
| Maximum Delivery Offer (MDO) | As defined in BC1.A.1.5 Dynamic Parameters . |
| Maximum Delivery Bid (MDB) | As defined in BC1.A.1.5 Dynamic Parameters . |
| Offer Acceptance | An acceptance by a BM Unit of a Bid-Offer Acceptance to increase its export onto, or decrease its import from, the National Electricity Transmission System , where in this context import and export are as defined in the BSC . |

BC1.A.1.5 Dynamic Parameters

Maximum Delivery Offer (MDO), being a series of MWh figures and associated times making up the profile of the maximum volume of **Offer Acceptances** by a **BM Unit** which can be instructed by **The Company** through **Bid-Offer Acceptances (BOA)** via a **BM Participant** with respect to one or more of their **BM Units**, such that within the current **Balancing Mechanism Window Period**, the **BM Unit's Committed Level** can be adhered to, and contracted **Ancillary Services** can be delivered.

Maximum Delivery Bid (MDB), being a series of MWh figures and associated times making up the profile of the maximum volume of **Bid Acceptances** by a **BM Unit** which can be instructed by **The Company** through **Bid-Offer Acceptances (BOA)** via a **BM Participant** with respect to one or more of their **BM Units**, such that within the current **Balancing Mechanism Window Period**, the **BM Unit's Committed Level** can be adhered to, and contracted **Ancillary Services** can be delivered.

Principles

Slido Code # DTP

1. Data submitted must be as precise as possible, as NESO use information outside the BM window for scheduling decisions and within the BM window for scheduling and BOA creation.
2. MEL/MIL is applied to safeguard the Power range.
3. MDO/MDB is used to protect the MWh volume.
4. The market provider all MWh volume available for BOA instructions through MDO/MDB
5. Units must submit MDO/MDB protecting any reserve/response contract volumes, ensuring coverage for every minute across the full 42-hour horizon
6. If no BOAs are sent, no PN changes are made and no contracts are won, MDO/MDB values would not need to be redeclared as time passes through the day.
7. MDO must be submitted as positive value and MDB as negative value

Calculation of MDO/MDB

Protected Period: The designated duration within which contracted energy volumes are required to be protected and assured for availability during specified contracted operational windows (such as for Reserve or Response), to satisfy the terms of contractual agreement

Protected Period = From four Settlement periods before Contracted operational window to two settlements period after + any time to trade.

Protected Volume: The specified quantity of energy that is withheld from utilisation and reserved to ensure its availability for fulfilling contractual obligations, such as providing reserve or response services

Protected Volume = Total available energy volume at any given minute - energy volume required to provide reserve or response services
(cumulative if more unit holds multiple contracts)

Note: The definition refers to the minimum protection period which will allow the unit to charge or discharge as required if there is an instruction sent in that time to ensure they are back at required SoC for any reserve/response contracts or planned PN's. The provider will need to factor in additional time required to trade and/or for any other reason.

Key considerations

The market providers need to consider the following while calculating MDO/MDB

1. The declared MDO/MDB values must be accurate for the entire 42-hour horizon to enable NESO to not only utilise the available volume for issuing instructions (within BM window) but to also plan the unit outside of BM window in scheduling process.
2. They will only need to re-declare MDO/MDB if an instruction is issued. So, if time moves on and there is no instruction issued, no new contracts won or any plant breakdown then they should not need to declare their MDO/MDB values for the given period.
3. As part of the initial submissions, the declared MDO/MDB must accurately account for any future PNs, reserve or response contracts and ensure corresponding volume is protected from a specified future time point. The provider is responsible for determining the appropriate time point from the PN volume should be protected and calculate MDO/MDB accordingly. The changes to MDO/MDB (which is not in response to an instruction) to protect PN's must not be made later in the day as this would negatively impact NESO scheduling process.
4. If an instruction is issued, the provider must promptly re-submit updated MDO/MDB values along with the operational baseline to ensure they are at the correct State of Energy (SoE) and capable of delivering any reserve or response contract in the future. They also need to ensure they are at the correct SoE to deliver any reserve or response contract

Implementation

Slido Code # DTP



OBP changes for Fast Dispatch, Target Dispatch and the Battery Volume Calculator expected to be in **System Test in Mar 2026, Technical go-live Apr 2026, Business Go-live June 2026**



BM EDL changes **expected to be in production Feb 2026**



NDO due to start **parallel run Jan 2026**, expected that NDO will provide **master target programme in May 2026**, FSOE in NDO expected to be in **System Test in May 2026, Business go-live Jun 2026**



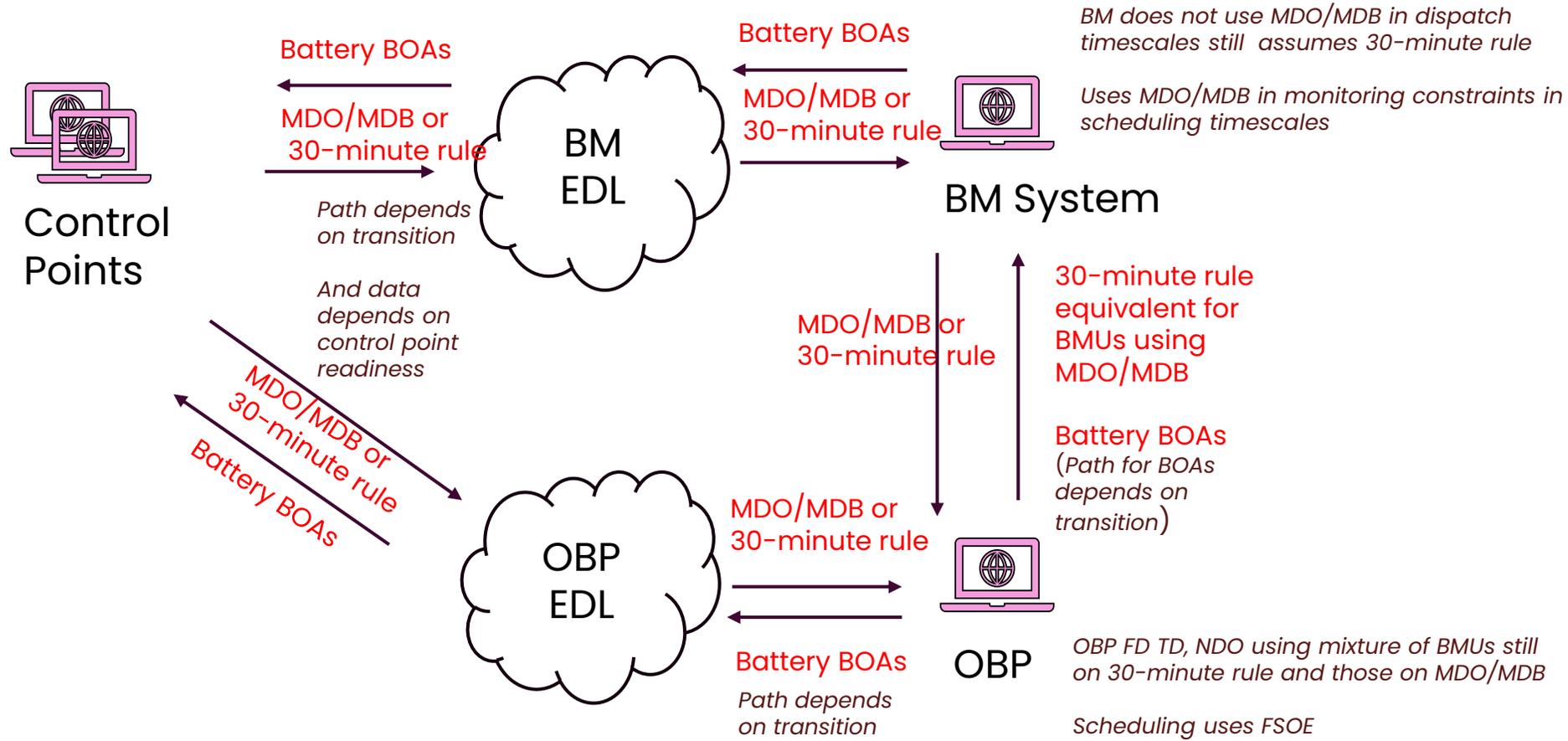
Provide data to BMRA for publication – **System Test in Mar 2026, Business go-live Jun 2026**



Switch over from 30-minute rule to MDO/MDB for providers that are ready – **June 2026**

Overview

Slido Code # DTP



GC0166 – Day in the life

Forum Breakout

28/01/26

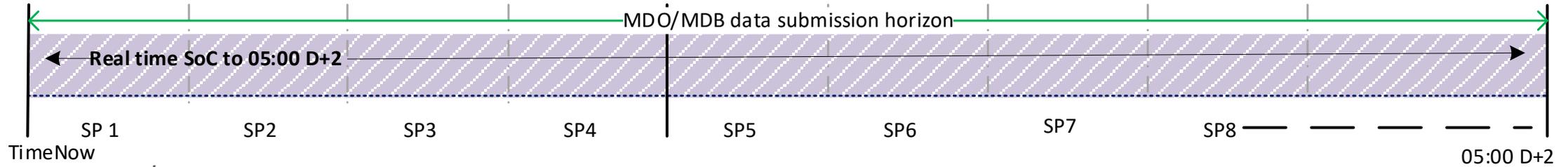
Summary of Methodology

Slido Code # DTP

- Main function of MDO/MDB to inform NESO about **available MWh volume** for BOA instruction (inside BM window) & scheduling (outside BM window)
- MDO/MDB submissions made from the current minute onwards, with **1-min granularity**, matching the time horizon for which PNs submitted (**11:00 to 05:00 D+2**)
- MDO/MDB should be calculated ensuring any reserve/response contract volumes and PNs are **protected**
- **FSoE modelling** will use MDO/MDB data to allow NESO to schedule over the full PN submission time horizon in conjunction with other static data provided under GC166 (e.g. Max/Min SoC, charge/discharge efficiency etc) and real-time SoC

Future State of Energy (FSoE) model Implementation

Slido Code # DTP



Once MDO/MDB is utilised we will start implementing the FSoE Model to increase the accuracy of the Scheduling process. This will be used in addition to MDO/MDB data. As the FSoE model will not be 100% accurate the MDO/MDB data will ensure the actual BOA **does not exceed the MWh capability by even a minute.**

The FSoE model will require a combination of the below data. The trials we are running will validate exact data requirements.

All below is static, one value covering the operational day received via Single Markets Platform (SMP), apart from **Real time SoE** – which will be received via the SCADA system (IEMS). SMP values can be changed at any time and the system will refresh every 30 minutes.

- Max SoE, (NESO calculate time varying limits from Reserve and Response contracts)
- Min SoE,
- Charging efficiency
- Discharging efficiency
- SoE limit positive
- SoE limit negative
- Daily cycle limit
- MWh cycle limit
- MW power capability import
- MW power capability export
- MWh export
- MWh import
- **Real time SoE**

Scheduling

Slido Code # DTP

As mentioned, **FSoE modelling** will use MDO/MDB data to allow NESO to schedule over the full PN submission time horizon in conjunction with other static data provided under GC166.

- The optimiser in the FSoE model will be able to consider any charge/discharge combination as it sees fit.

Whilst this is developed and implemented, an interim approach for scheduling will be used, as described on the next slide using the concept of **Pseudo MEL/MILs** over a selected time window.

- This intermediate step ensures our BM systems can take full account of limited duration assets prior to delivery of the end state solution (FSoE in OBP).

Scheduling – Pseudo MEL/MIL

Slido Code # DTP

The operational day(s) is split into selected **blocks of time** for scheduling purposes (e.g. 3hrs).

Submitted **MDO/MDB data is used** and the **lowest values** in this selected time window are identified.

A '**Pseudo MEL**' and '**Pseudo MIL**' are then calculated and fed into our BM systems, using the following approach:

The lowest MDO/MDB over the selected time window, in MWh, is divided across the number of hours in the time window and converted to a MW figure as shown in the examples on the next slide.

Scheduling – Calculating available volume for period 17:00 – 20:00

Slido Code # DTP

Pseudo MEL

- Take the lowest value of MDO for selected 3hr period
- Convert MWh to MW
- Divide by duration (in hrs)

$$\text{Pseudo MEL} = (50 * 2) / 3 = \mathbf{33.33MW}$$

Pseudo MIL

- Take the lowest value of MDB for selected 3hr period
- Convert MWh to MW
- Divide by duration (in hrs)

$$\text{Pseudo MIL} = (-30 * 2) / 3 = \mathbf{-20MW}$$

| Time | PN | BOA | MEL | MIL | MDO | MDB |
|---------------|-------|------|--------|---------|-------|--------|
| | | | | | MWh | MWh |
| 17:00 - 17:30 | 0.00 | 0.00 | 100.00 | -100.00 | 70.00 | -30.00 |
| 17:30 - 18:00 | 0.00 | 0.00 | 100.00 | -100.00 | 70.00 | -30.00 |
| 18:00 - 18:30 | 20.00 | 0.00 | 100.00 | -100.00 | 60.00 | -40.00 |
| 18:30 - 19:00 | 20.00 | 0.00 | 100.00 | -100.00 | 50.00 | -50.00 |
| 19:00 - 19:30 | 0.00 | 0.00 | 100.00 | -100.00 | 50.00 | -50.00 |
| 19:30 - 20:00 | 0.00 | 0.00 | 100.00 | -100.00 | 50.00 | -50.00 |

Scenario 1 overview (30-min granularity)

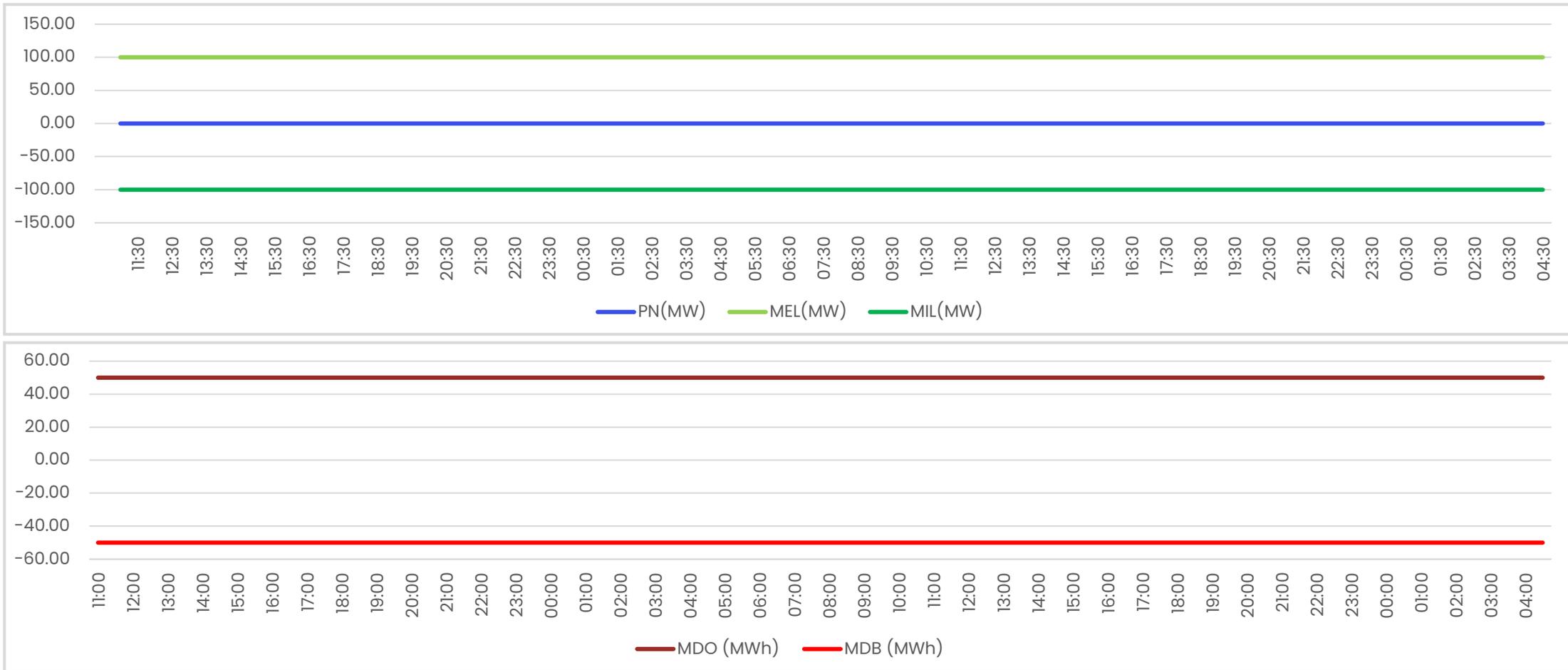
Unit = 100 MW/100 MWh
Initial SoC = 50%
Efficiency = 100%
Time horizon = 11:00 to 05:00 D+2

Worked examples covered:

1. Unit with no BOA, zero PN and no reserve/response contracts
2. Unit with no BOA, zero PN and a reserve contract
3. Unit with no BOA, zero PN, a reserve and response contract
4. Unit with no BOA, non-zero PN, a reserve and response contract
5. Unit with a BOA, non-zero PN, a reserve and response contract
6. Unit with a BOA, non-zero PN, two reserve and one response contract with overlapping protection periods

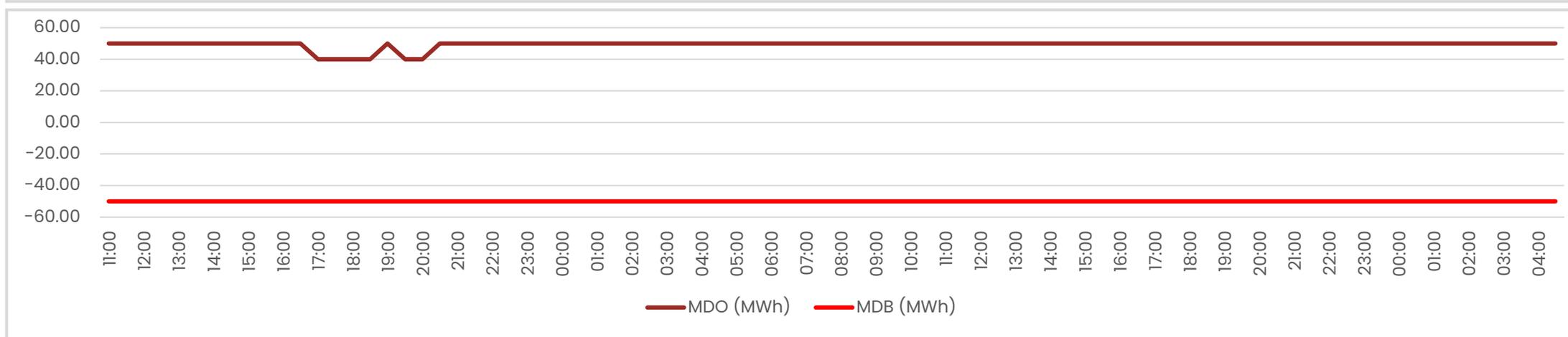
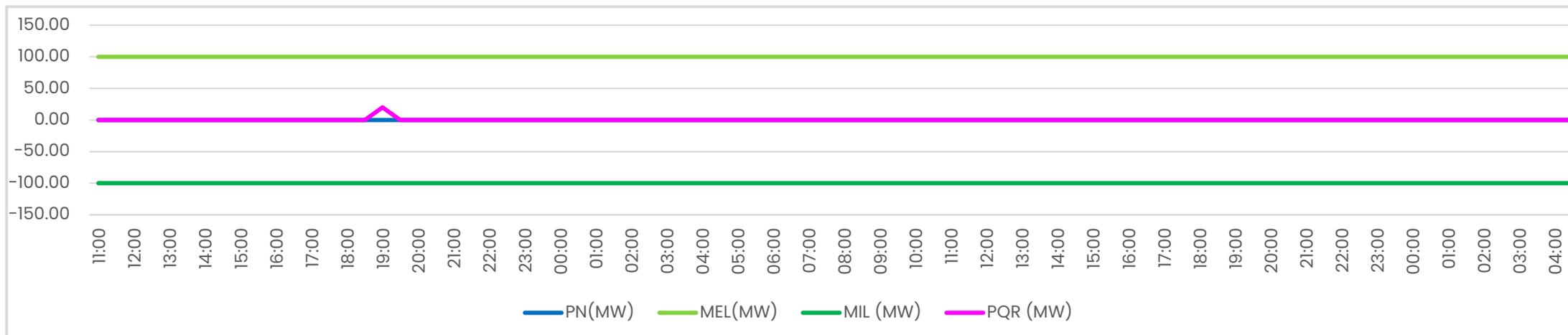
Examples demonstrate impact on MDO/MDB for each

1) Unit with no BOA, zero PN, no reserve/response contracts



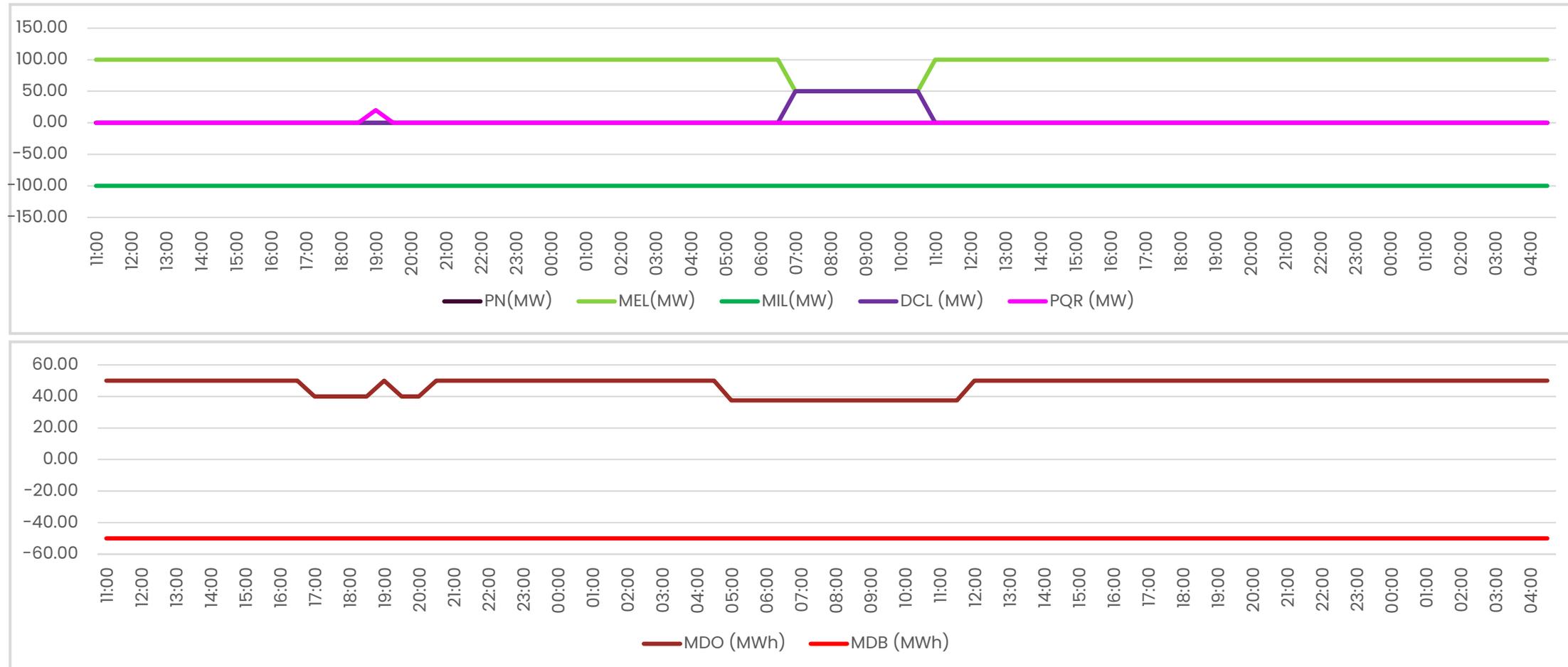
With no BOA, PN or any reserve/response contracts, MDO/MDB values do not need to be re-declared, and they remain constant throughout the entire time horizon.

2) Unit with no BOA, zero PN & a reserve contract



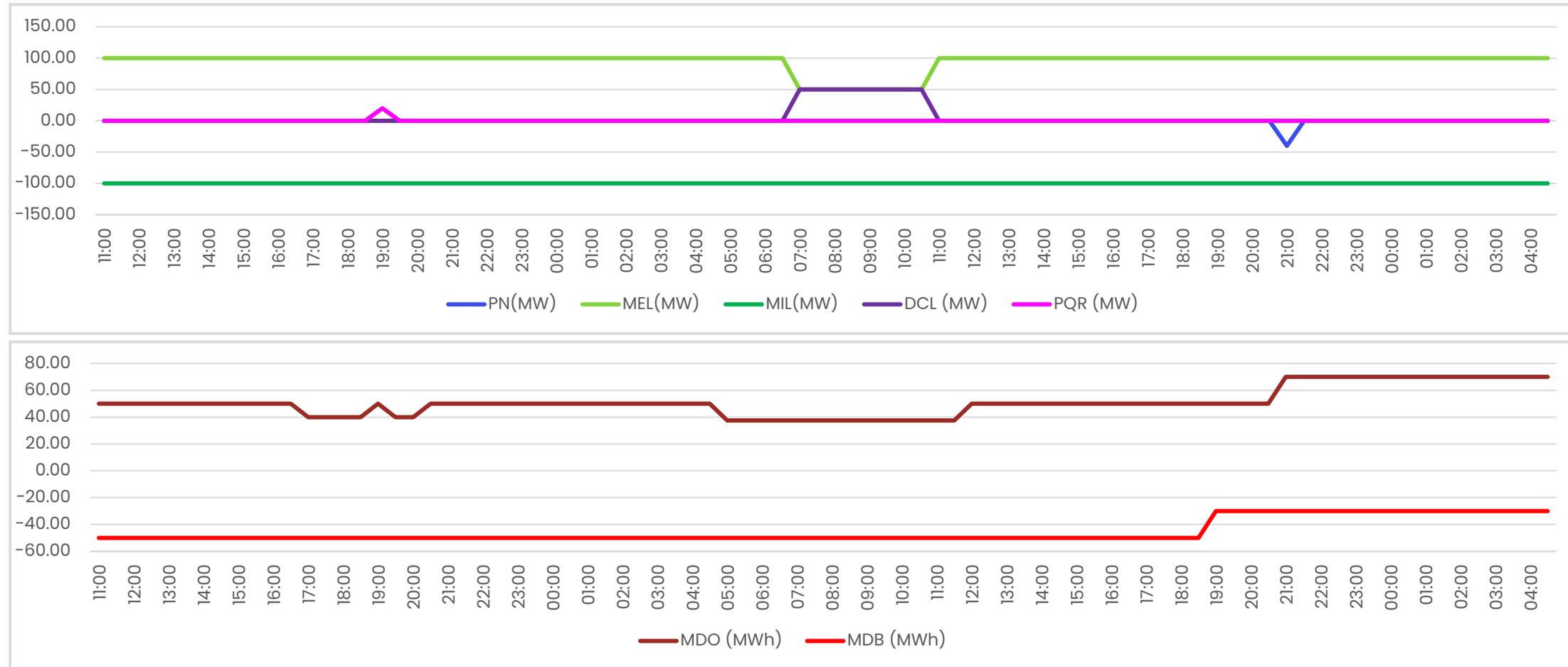
Unit has a 20 MW Positive Quick Reserve (PQR) contract from 19:00 to 19:30

3) Unit with no BOA, zero PN, a reserve and response contract



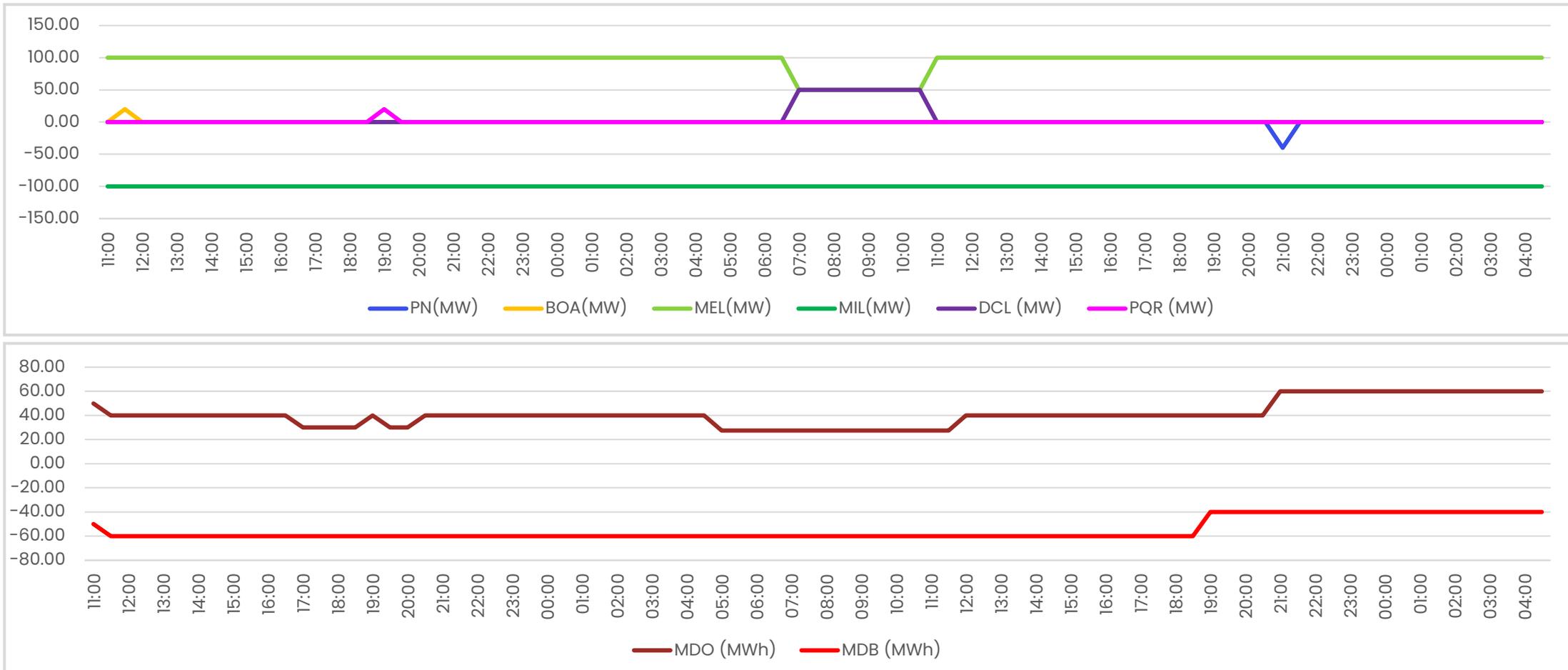
- Unit has a 20 MW Positive Quick Reserve (PQR) contract from 19:00 to 19:30
- Unit has a 50 MW Dynamic Containment Low (DCL) contract from 07:00 to 11:00

4) Unit with no BOA, non-zero PN, reserve and response contracts



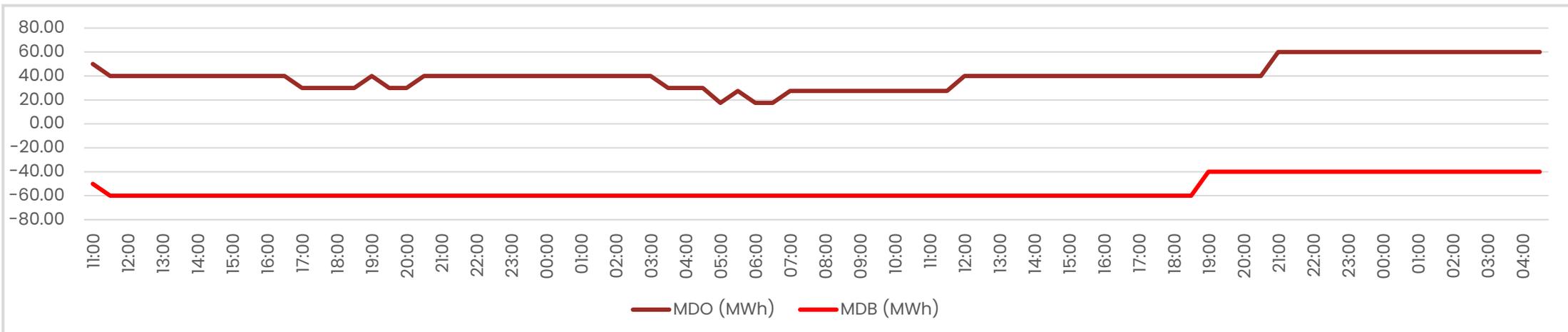
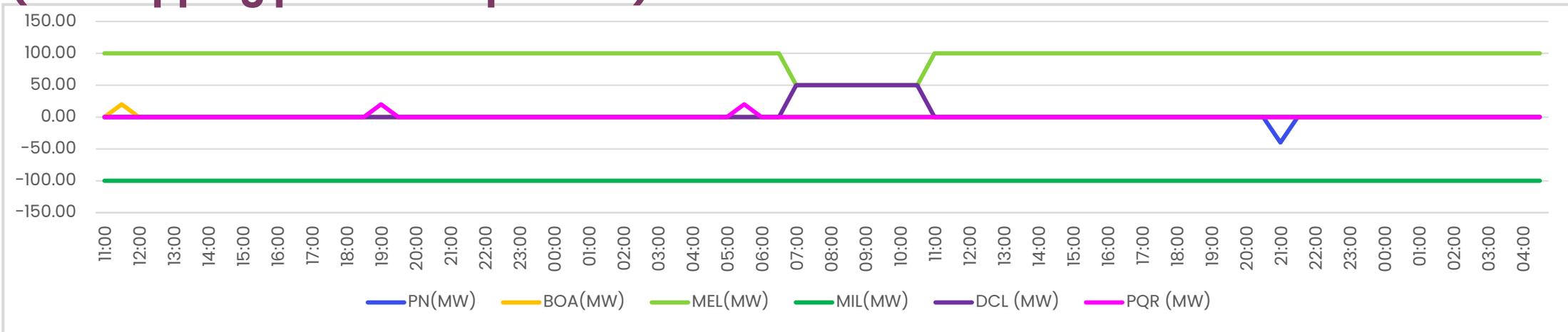
- Unit has a 20 MW Positive Quick Reserve (PQR) contract from 19:00 to 19:30
- Unit has a Dynamic Containment Low (DCL) contract from 07:00 to 11:00
- Unit submits a charge PN of 40MW from 21:00 to 21:30

5) Unit with a BOA, non-zero PN, a reserve and response contract



- Unit has a 20 MW Positive Quick Reserve (PQR) contract from 19:00 to 19:30
- Unit has a Dynamic Containment Low (DCL) contract from 07:00 to 11:00
- Unit submits a charge PN of 40MW from 21:00 to 21:30
- Unit receives 20MW BOA from 11:30 to 12:00

6) Unit with a BOA, non-zero PN, 2 reserve and 1 response contract (overlapping protection periods)



- Unit has a 20 MW Positive Quick Reserve (PQR) contract from 19:00 to 19:30 & 05:30 to 06:00
- Unit has a Dynamic Containment Low (DCL) contract from 07:00 to 11:00
- Unit submits a charge PN of 40MW from 21:00 to 21:30
- Unit receives 20MW BOA from 11:30 to 12:00

Scenario 2 overview (1-min granularity)

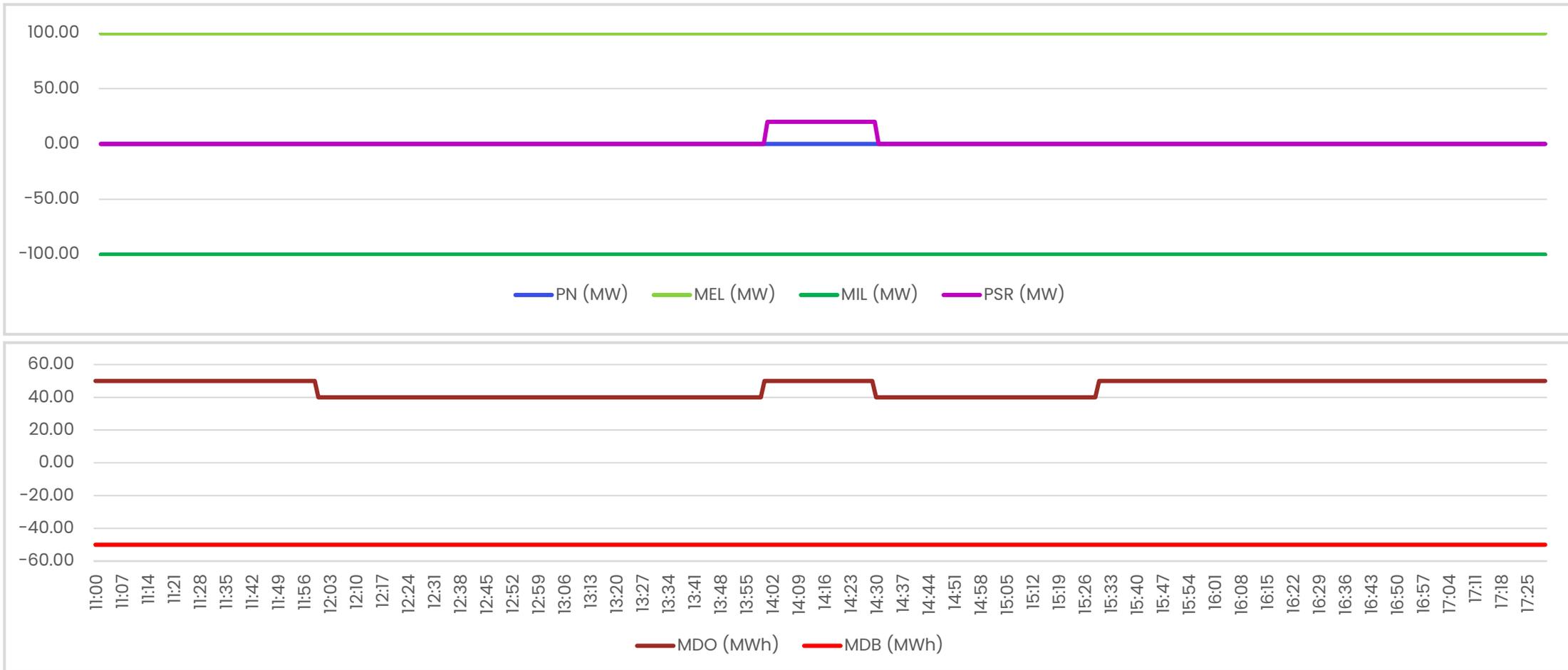
Unit = 100 MW/100 MWh
Initial SoC = 50%
Efficiency = 100%
Time horizon = 11:00 to 05:00 D+2

Worked examples covered:

1. Unit with no BOA, zero PN and a reserve contract
2. Unit receives 1st BOA, has zero PN and a reserve contract
3. Unit receives 2nd BOA, has zero PN and a reserve contract
4. Unit submits a PN following BOAs received & has a reserve contract

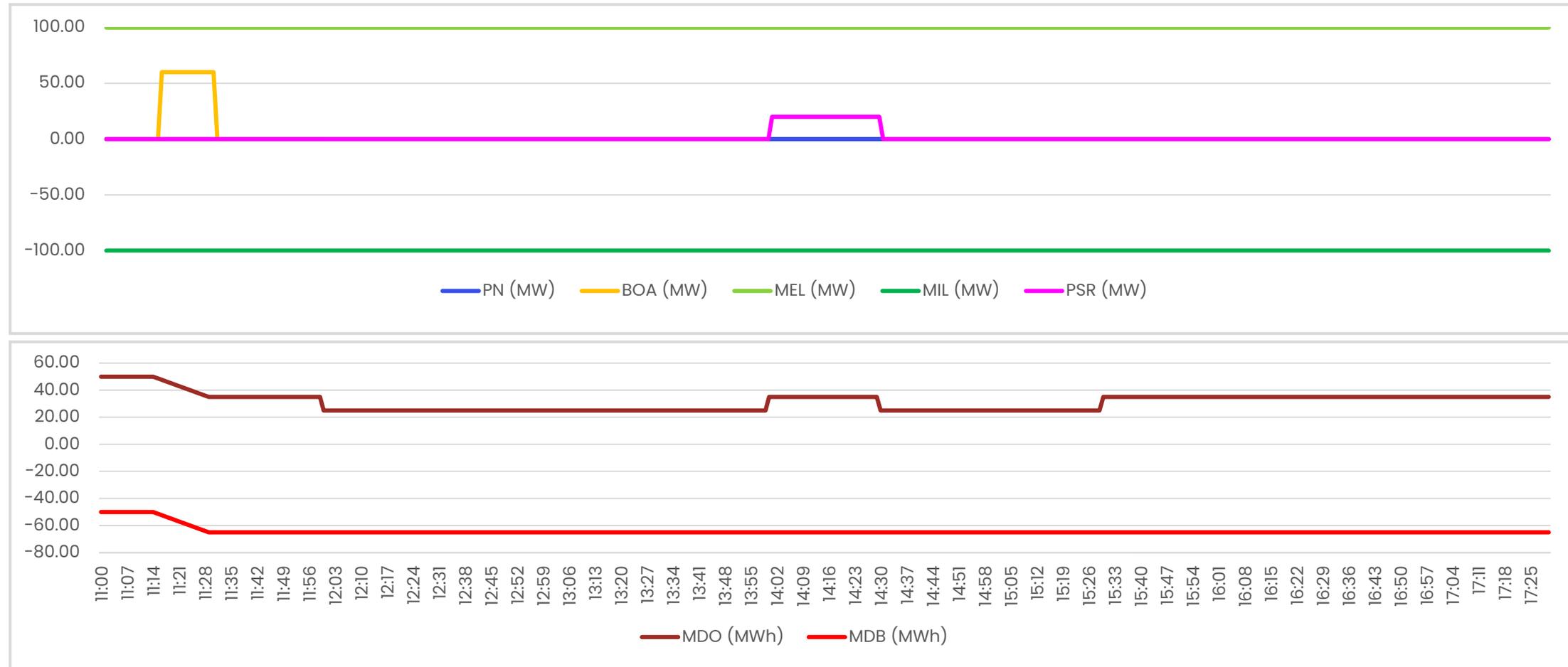
Examples demonstrate impact on MDO/MDB for each

1) Unit with no BOA, zero PN and a reserve contract



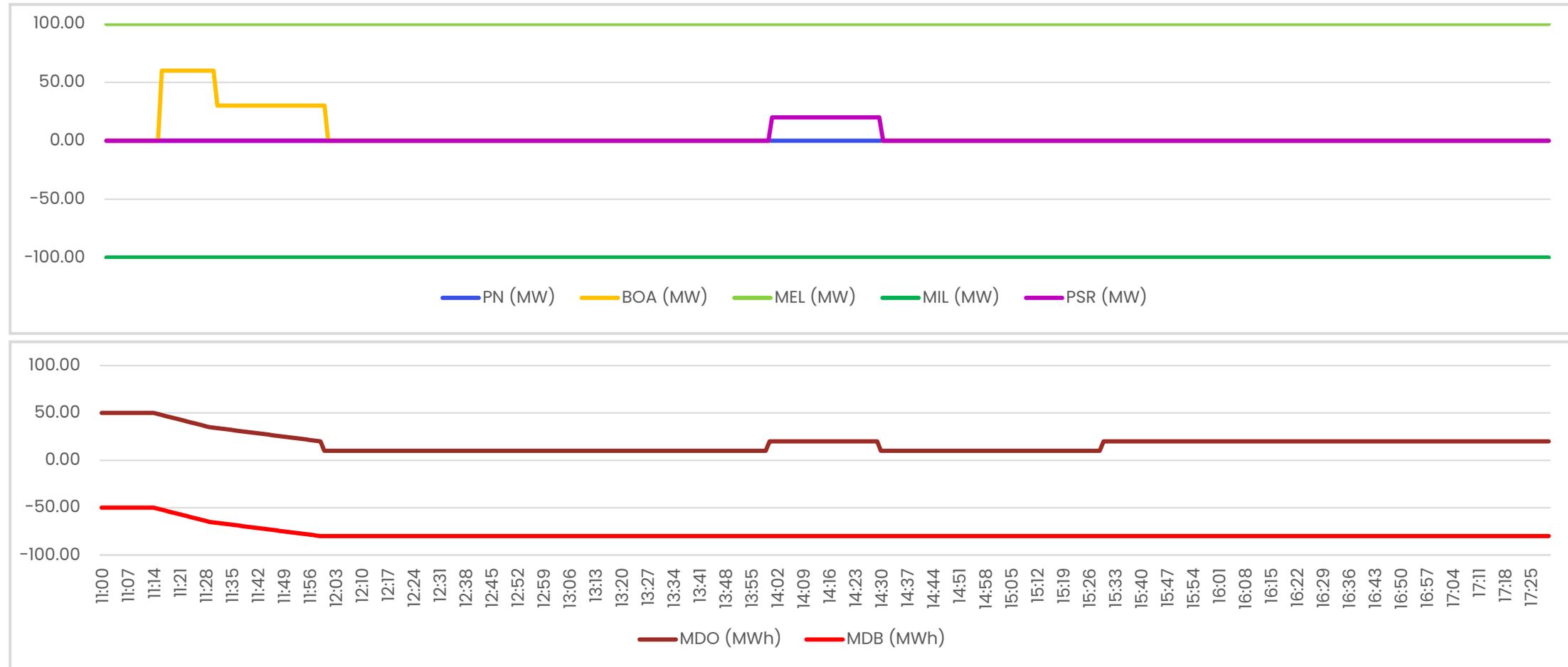
Unit has a 20 MW Positive Slow Reserve (PSR) contract from 14:00 to 14:30

2) Unit receives 1st BOA, has zero PN and a reserve contract



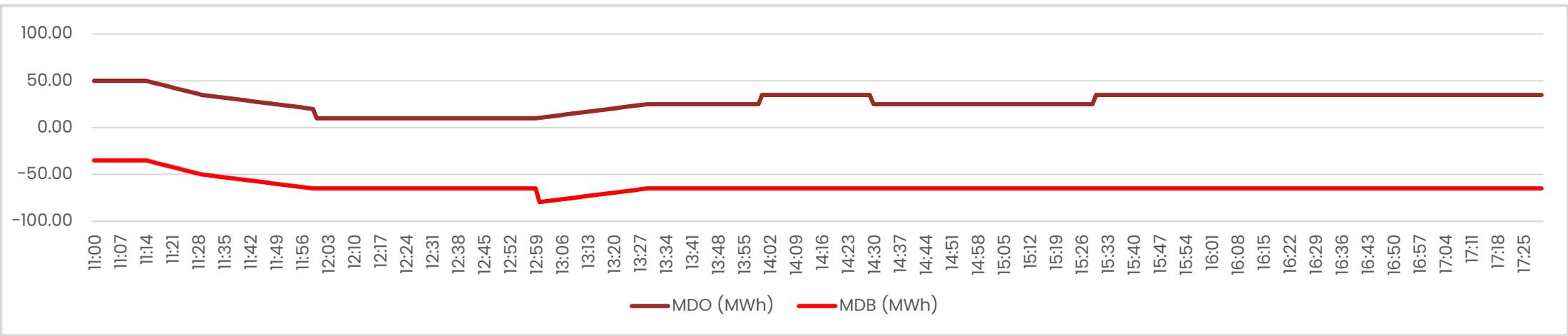
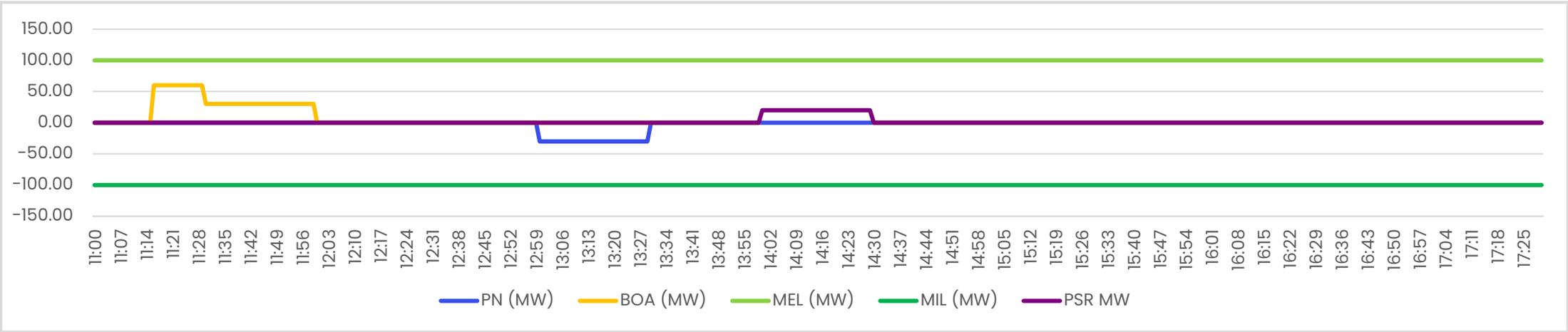
- **Unit has a 20 MW Positive Slow Reserve (PSR) contract from 14:00 to 14:30**
- **Unit receives first BOA (60MW for 15mins) (11:15 to 11:30)**

3) Unit receives 2nd BOA, has zero PN and a reserve contract



- **Unit has a 20 MW Positive Slow Reserve (PSR) contract from 14:00 to 14:30**
- **Unit receives first BOA (60MW for 15mins) (11:15 to 11:30)**
- **Unit receives second BOA (30MW for 30mins) (11:30 to 12:00)**

4) Unit submits a charge PN following BOAs received & has a reserve contract



- Unit has a 20 MW Positive Slow Reserve (PSR) contract from 14:00 to 14:30
- Unit receives first BOA (60MW for 15mins) (11:15 to 11:30)
- Unit receives second BOA (30MW for 30mins) (11:30 to 12:00)
- A 30MW charge PN is submitted from 13:00 to 13:30

Q&A

**Thank you.
Safe journey.**